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European Cooperation in Science and Technology


# Annual Report 2006

**Cover Page**:
"European Forum on Nanosciences", held in Brussels on 19 - 20 October 2006.

European Coperation in Science and Technology

# Annual Report 2006

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# Foreword

After the serious difficulties encountered in 2002 and 2003, COST experienced a period of "renaissance" in the subsequent three years. Now, there is renewed confidence and enthusiasm in the COST research community, further strengthened by the secured support from the EU RTD Framework Programme.

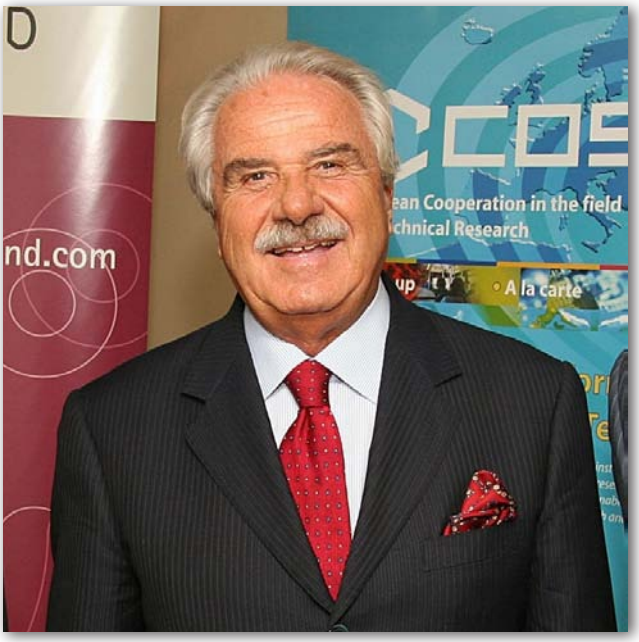
2006 was the third year of this "renaissance" which started at the beginning of 2004 with the establishment of the fully operative COST Office in Brussels on the basis of a contract between the European Science Foundation acting as implementing agent for COST - and the European Commission.

The intense period of reforms within COST that followed has further contributed to the COST "renaissance".

The complete and profound restructuring of the COST scientific domains – the first one after 35 years - has proved to be a major milestone for COST and a real "Copernican revolution". It has launched COST into the future, being a true "exploratorium" of new ideas in the most promising fields of science. The restructuring was not obtained by simply reducing the number of COST domains, as requested by the COST Ministerial Conference held in Dubrovnik in 2003. It was achieved by starting again from a "tabula rasa" and by establishing a completely new structure now based on 9 new scientific domains. With this decision the Committee of Senior Officials (CSO) proved to be a real strategic body for COST by establishing and implementing a sound scientific strategy for the future. Now, COST is a modern network for European cooperation in science and technology at the service of European researchers. COST has been re-positioned so that it can act as a real pre-cursor for the Framework Programmes. Moreover COST can provide an essential collaboration system to underpin the European Research Council, support the younger generation of researchers. Most importantly, COST proved to be a key element of the European Research Area and to be able to contribute significantly to achieving the Lisbon and Barcelona objectives.

The notion of interdisciplinarity has been a key issue of the reformed scientific domains. Not only the domains themselves are inter-disciplinary; this interdisciplinarity is also ensured through the "Strategic Workshops", organized by COST on subjects of intrinsic interdisciplinary nature. In the past three years, COST organised and held strategic workshops on "Environment and Health", "European Cultural Heritage", "Food and Health" and "Nanosciences".

Another major reform introduced in COST concerned the introduction of a continuous Open Call for Proposals, together with a strengthened and consistent use of external peer




*Professor Dr Ing Francesco Fedi*
*President COST Committee of Senior Officials*

reviews. This continuous Open Call for proposals is based on a two-stage process, reconciling the advantages of the COST tradition and the need for a highly transparent process of presenting proposals for new Actions. The call is continuous, i.e. the scientific community can present a proposal for a new Action at any time and on any subject, following the successful tradition of COST. The call is open, i.e. the selection process follows the "bottom-up" tradition of COST. The process is based on a call for proposals: the benefits of Calls for Proposals, generally seen as raising visibility within the research community and creating openness, have been introduced. The call is based on a two-stage process (preliminary proposal and full proposal). Preliminary proposals of maximum three pages go through an initial filter. Only those deemed of sufficient interest, potential intrinsic quality, and European added value are invited to submit a full proposal. This should reduce the disadvantages calls generally have to face, such as the problem of oversubscription (i.e. a large number of new full proposals, frequently not of sufficient quality), a huge workload in processing proposals within the COST Office, the review system and the disillusion which may arise within the research community due to the rejection of a large number of full proposals.

Monitoring the Actions in progress and the final evaluation of completed Actions (including external peer reviews) has always been a tradition in COST and a very good example of "Quality Control" in the European Research Area. Quality control is essential in all research endeavours, both for direct research funding and for networking of researchers. In all these cases, peer review is normally applied to determine the quality of the research being undertaken. COST has established guidelines for the assessment, monitoring and evaluation process. These guidelines have been reviewed and have to be followed by all the Domain Committees which are obliged to involve external reviewers, both in the assessment of new proposals and in the evaluation of completed Actions. In order to obtain the services of top quality reviewers, remuneration for experts has been introduced.

COST Governance has been the third important reform introduced in COST. The strategic role of the CSO, bringing together representatives of the governments of the 35 COST countries, was reinforced. A major activity of the CSO will be dedicated to discussion and approval of COST strategic and political goals such as the COST mission in the ERA, COST's contribution to the Lisbon objectives, COST communication strategy, COST penetration in quantity and quality, COST as an instrument of integration across Europe, COST as an asset for the implementation of the European RTD policy towards the rest of the world. and similar topics of a strategic nature. The CSO role in COST governance was also addressed and strengthened. It was decided that the CSO will continue to stay abreast of developments taking place in the scientific community, this being reflected, in particular, in the assessment, monitoring and final evaluation of COST Actions. These decisions, together with the introduction of voting procedures based on a ¾ majority - another milestone in the history of COST - has allowed the CSO to develop its role as a truly strategic body.

The role of the CSO Executive Group - the so-called JAF Group -, formed by the President and Vice-President of the CSO together with five other CSO members (two of them rotating every year), was also reinforced. The main tasks of the JAF Group were established as follow: recommendation of new Actions; generation, evaluation and revisions of documents for the CSO; monitoring the management of the COST budget and the COST Office activities; approval of prolongations of Actions, and scrutiny of applications of participation in COST Actions from Institutions from non-COST countries.

The delegation of the management of the Action from the COST Office to the Actions themselves will be introduced starting from 2007. This delegation is a further milestone in the process of reforming COST governance. Streamlining the approval of Actions will be the final challenge to complete the modernisation of COST governance.

In October 2006, COST confirmed the European Science Foundation (ESF) as the legal entity to act as the implementing agent for COST and to provide the scientific, technical and administrative secretariat to COST Domain Committees and to COST Actions during the next Seventh Framework

Programme. To this end and with the objective of strengthening COST and ESF as separate instruments within the ERA and of further developing the synergy between them, while maintaining a clear distinction between their individual characteristics and their complementary roles, an Addendum to the current COST-ESF Memorandum of Understanding established in 2002 was agreed by the COST Committee of Senior Officials and by the ESF Governing Council.

The reform process underway in COST was fully recognized by the High Level Panel established by the European Commission for the Mid-Term Review of the EC-ESF contract for COST. The Panel recognized the important role of COST for achieving the Lisbon and Barcelona objectives and recommended to the European Commission to release the entire sum of 80M€ from FP6, the upper limit of support for COST within the Sixth Framework Programme (FP6), and particularly important, to continue to support COST in the future with increased support within FP7.

The European Commission, in its latest proposal for FP7, stated its intention to enhance the synergy between FP7 and COST and to include financial support for COST and its activities. Furthermore, an active cooperation with the Commission has been introduced, supervised by a High level Group between COST and the European Commission, and co-chaired by the Director General of DG Research and the COST CSO President. This is a sign of renewed confidence in COST and has enabled the development of a strong partnership between COST and the European Commission.

At the political level, COST has been acknowledged on a number of occasions. Several times, the Competitiveness Council of Ministers of the European Union stressed "the importance of reinforcing the ties between the Framework Programmes and European intergovernmental organizations such as COST" and underlined "that European technology initiatives should achieve synergies with existing schemes such as COST taking into account its important contribution to R&D". Such political recognition of COST is especially important in securing future support.

COST has also built links with the European Parliament. COST has been explicitly mentioned in the Report of the Rapporteur to the European Parliament on the Seventh Framework Programme. A very successful COST exhibition in the European Parliament was held from 18 to 21 April 2006, with the participation of Commissioner Dr Janez Potocnik, of the Chair of the Committee on Industry, Research and Energy (ITRE) of the European Parliament, Mr Giles Chichester, and of Professor Buzek, the Rapporteur to the European Parliament for the Seventh Framework Programme.

During 2006 COST strove for ensuring the wide dissemination of the results of its Actions to "user" communities, including policy makers at all levels. Where appropriate, COST encouraged the use of results to foster European commercial and industrial competitiveness. The development and intensification of links with EUREKA is a cornerstone of this approach, and there has been an ongoing consultation between COST and EUREKA. COST participated in the EUREKA Ministerial Conference held in Prague in June at the invitation of the Czech EUREKA Presidency. This participation was the result of mutual presentations by the COST and EUREKA Presidencies at the level of EUREKA's High Level Group and COST's Senior Officials Committee and regular exchanges of information at the level of specific domains and the respective secretariats.

The visibility of COST in the various COST countries was raised by the numerous COST Information Days organized in Italy (Milan, Rome, and Bologna), in Turkey (Ankara), in Scotland (Edinburgh), in the Netherlands (Utrecht), in Romania (Bucharest and Timisoara), in Ireland (Dublin), in France (Nice), and in Bulgaria (Sofia).

COST has demonstrated its ability to be an asset for the implementation of the European RTD policy towards the rest of the world. It does this with considerable success thanks to COST flexibility and the ease of access of participation for third country institutions in COST Actions. Consequently COST did not restrict itself to only serving the European research community, and it did not confine itself geographically. Following its traditions, it continued

to be an open networking system, encouraging the participation - on the basis of mutual interest and benefit - of researchers and colleagues from all over the world. COST Information Days were organized in China (Bejing and Shangai), in Ukraine (Kyiv), in Argentina (Buenos Aires), and in Australia and New Zealand.

The European scientific community continues to acknowledge COST as a "fast, efficient, effective flexible framework to bring European researchers together, under light strategic guidance, to let them work out their ideas". This perception was confirmed by a survey which revealed that "if COST did not exist it would be necessary to invent it". The interest of the European scientific community in COST has been recently confirmed by the overwhelming response to the COST Open Call for Proposals launched in May 2006 where more than 800 preliminary proposals were received for the selection of only some 40 new COST Actions.

The reforms introduced in COST in the last three years together with the role that COST has had within the European Research Area in the past 35 years have been fully recognised. This includes the development of European scientific endeavours in many key areas at the frontiers of our knowledge, the establishment of networks of thousands of leading Scientists, the increase of mobility of researchers across Europe, the improvement of cooperation in science and technology and the creation of a better understanding among European countries. In December 2006, the Council of the European Union adopted a Decision concerning the Specific Programme "Cooperation" implementing the Seventh Framework Programme of the European Community, according to which at least EUR 210 million and up to EUR 250 million should be attributed to COST, subject to the mid-term evaluation. This financial support will be provided through a grant which will be paid on the basis of a grant agreement between the Commission and a legal entity designated by COST as its implementing agent and communicated to the Commission by the General Secretariat of the Council and identified in the Work Programme.

The increase of between 50% and possibly more than 78% of the financial support to COST with respect to the Sixth Framework Programme is a reward of paramount importance for the entire COST family. For the members of the COST Committee of Senior Officials whose dedication and sense of ownership made it possible to introduce a number of reforms which are real milestones in the history of COST. For the Chairs and members of the newly appointed scientific COST Domain Committees, nominated among the most outstanding European scientists. For the participants in the COST Actions, the real "raison d'être" of COST, and, in general, for the entire European scientific community whose more than 800 proposals presented as response to the first COST Call for the selection of some 40 new Actions confirmed all the vitality of the COST framework. For the COST Office established by the European Science Foundation in Brussels acting as COST implementing agent. For the COST Secretariat provided, since the very beginning of COST, by the General Secretariat of the EU Council. I wish to express the gratitude of the entire COST family to the members of the European Parliament who confirmed the interest in COST that has emerged in the COST exhibition in the Parliament held in April 2006, to the European Commission and "dulcis in fundo" to the Council of the European Union and, in particular, to the members of its Research Working Party which gave this strong support to COST.

All these achievements give me great confidence for the future of COST at the service of the European scientific community and for the benefit of the European citizens.

# A view from the Council Secretariat

2006 has been an exceptional year - both in terms of European research in general and the COST framework in particular. In December 2006, the European Parliament and the Council adopted a legislative package for the Seventh RTD Framework Programme. With a budget of more than 50 billion Euro, an extended duration of 7 years, and major new instruments (such as the European Research Council and the planned Joint Technology Initiatives) it is without doubt the most ambitious Community contribution to the creation of the European Research Area and a significant element of the Lisbon process.

This has been reflected in the development of COST. Extensive reforms have been put in place and most notably COST has launched its Open Call process. COST and the Framework Programme "hybridised" in the Council Decision concerning the "Co-operation" Specific Programme, which allocated the largest budget to COST ever. However COST is much more than a "210-250 million footnote" in a multi-billion Framework Programme! Under its President Professor Fedi, COST has shown its capacity to reform and renew itself while maintaining its best practice and its most successful "product", the COST Action. Accordingly, COST now features a truly bottom-up approach with a rigorous peer review whilst directly involving the scientific community, combined with the inter-governmental approach, and all the while with COST membership extending beyond the Member States of the European Union in a true spirit of the European Research Area. The proven and newly improved quality of the "COST brand", with its demonstrated cost-efficient capacity to network and co-ordinate national research efforts, undoubtedly convinced the European legislator that taxpayers' money invested in COST was well-invested money.

In 2007, COST is equipped to live up to its potential in the European Research Area, and will have to prove itself in managing its increased activity. 2007 will also mark the launch of a broad debate on the future of the ERA. COST will certainly take this opportunity to participate fully in this strategic debate and consolidate its role in the ERA. It will be a privilege for the Council Secretariat to continue its traditional role in providing its support to COST, in particular to its Senior Officials Committee and its re-elected President, Professor Francesco Fedi, whose dynamic leadership and dedicated commitment to European science I admire, respect and support.

*Professor Klaus Gretschmann*
*Director-General/ GSC*

# COST & the Commission:

## Building the ERA

Building the European Research Area is a real illustration of deriving strength from unity in diversity. As we are about to open a new era for Europe's Research Area, I am glad to be able to rely on COST as a valuable, long time ally of the European Union in overcoming fragmentation of research.

As this annual report testifies, 2006 was an important and successful year for COST.

Clearly, the decision to profoundly restructure the COST scientific domains and introducing a permanent and thematically Open Call is a significant step to modernise COST with a view to facing the challenges of the 21st century. The global research landscape is rapidly changing. I therefore appreciate the discussions on how COST can improve its international dimension. A simple mechanism to network the best scientists in this world, support their exchanges leading to joint actions is certainly an intended widening of the present COST focus.

The next reforms are put on the track as well. With the devolution of the actual management of their activities to the COST Actions themselves a further step will be taken within the upcoming FP7 period. It is obvious, that the value and the competitiveness of the COST instrument under the European Research Area crucially depend upon the efficiency of COST at every level.

And more work is ahead. The COST Mid-Term Review Panel recommended that a full assessment is to be made at the end of 2007. This will indeed be the moment to take stock of the role of a reformed COST and its potential to contribute to the achievement of the objectives of the European Research Area and to the Lisbon and Barcelona goals.

I look forward to continuing efforts to further modernise COST so that it continues enhancing cooperation and coordination of research activities in Europe and beyond, providing strong added value to realising the European Research Area. May the 2007 report be equally positive!

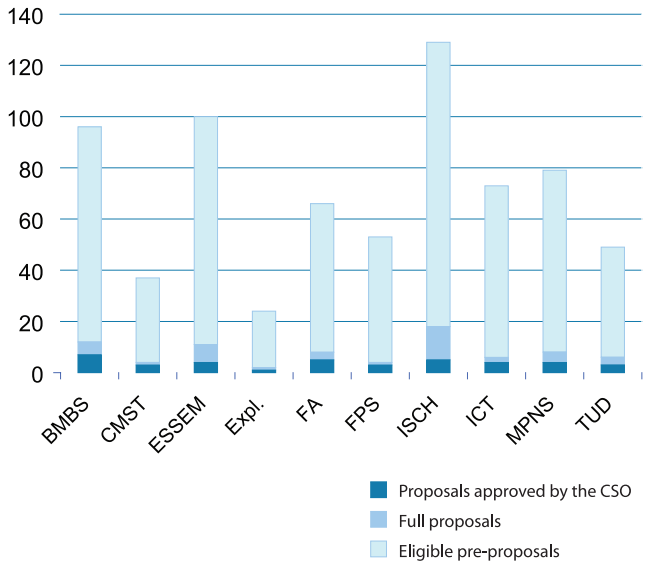
*Janez Potočnik*
*European Commissioner for Science and Research*

# Report from the COST Office

## Striving for increased visibility

The past year saw stable operations and brought many changes to the COST system at the same time. The COST Office faced a period of rapid learning and intensive activity. In its second year of operation the avenues to the future became clearer and the administrative procedures streamlined. New synergies with the ESF evolved and new joint initiatives started.

An important step for the future of COST was the decision of FP7. The European Union decided to continue and strengthen the support for COST considerably. In the coming seven years the budget of COST will be increased by at least 50%. This is a big achievement and shows the appreciation of the reforms implemented in the COST system.




*Open Call - collection date 2006*
*Proposals by Domain*

*Dr Martin Grabert*
*Director, COST Office*



The COST Committee of Senior Officials as well as the ESF Governing Council approved the continuation of the fruitful collaboration for the next contract. This shows how the intentions of bringing the two organisations close together have worked out since 2003.

Some events over the year 2006 should be mentioned here:

A continuous Open Call for proposals for new COST Actions was launched in April 2006. This introduced an element of competition to secure the high quality of COST Actions through rigorous peer review of the proposals. It supported increasing the awareness towards the opportunities COST offers within the scientific community in a transparent way, respectful to COST's «bottom up principle». The success was impressive with a spectacular number of more than 800 proposals received for the first collection date. Moreover, the two-stage

selection process involved actively a huge number of scientists via the new Domain Committees (DC) and external expert panels (EEP).

The COST Day, held in April in the European Parliament, put COST in the ramp light to politicians and decision makers. The contribution of COST to the ERA was widely recognised and appreciated. Certainly, COST has made more friends during these days and many MEP are interested in the ongoing evolution of COST.

Efforts have also been made to broaden the audience to the European citizen via TV broadcasts reporting on practical results of COST Actions, such as improved accessibility of buses for people with reduced mobility or laser cleaning of buildings and monuments on EURONEWS.

A further step in reforms was prepared to be implemented. In conjunction with the FP7 contract and complementary to the Open Call, the COST Grant System (CGS), launched end September, will provide more flexibility for scientific activities by the devolution to the Action of the day to day management through a system of grants replacing the former centralized system. Moreover, the CGS is the first milestone of a new global IT solution together wit ESF, taking into account all the business processes of COST. With the CGS, the grant holder will be able to manage the grant smoothly via a user-friendly online interface. The new system will also optimize the monitoring of the Action's progress, and facilitate both reporting and statistical information.


*COST Day*
*European Parliament,*
*18 April 2006*

# Completed Actions

## Biomedicine and Molecular Biosciences

### Action B16 – Reversal of Antibiotic Resistance (by inhibition of trans-membrane transport)

**2000 - 2006**
**Chair: Pr Joseph MOLNAR (HU)**
**Signatories: AT, CH, DE, FR, GR, PL, BE, HU, FI, PT, RO, IE, IL, NL, NO, SK, IT, CZ, ES, MK, LT, SE, TR, UK**

The main objectives of the Action was to investigate mechanisms of multidrug resistance in bacteria, fungi, cancer cells, viruses and parasites and the following development of new drugs capable of reversing this drug resistance. The Action aimed at:

• The synthesis of novel derivatives capable to reverse resistance in vitro and in vivo.

• The investigation of molecular mechanism of resistance in cancer cells, parasites, bacteria, fungi and viruses.

• The evaluation of prepared compounds

The objectives have been reached, as proven by the astounding figure of 725 publications, with approximately half being joint publications. The noted close cooperation between MC members and expert associated groups has resulted in the synthesis of a large number of compounds which have been and are still analysed for their properties with respect to efflux pumps of micro-organisms, parasites and cancer. A European patent (1432717-"Substituted disiloxanes" methods for their manufacture and their use for reversing multidrug resistance) has been obtained in collaboration with LIPONOVA (Hamburg) by members of the the Humboldt University Berlin, Germany and University of Szeged, Hungary.

Complemetary to the European Added Value of COST B16, through the networking of a large number of experts, the impact of COST B16 extented beyond the European continent for the purpose of evaluating results at the clinical level, a necessary requirement for the extension of these findings to the management of infectious diseases in Europe. Protocols involving the use of new and old compounds for the management of infectious diseases are now in progress in Africa (for malaria), in San Francisco (for a new variant CJD), in Argentina (for Multi-drug resistant Mycobacterium tuberculosis). One of the major achievements was the number of patents obtained for new compounds designed by MC members, like derivatives of phenothiazines (HU), the start of clinical trials for the use of phenothiazine for therapy of tuberculosis -to be implemented in Tanzania- coordinated by the NL MC members.

The collaboration between members of COST B16 led to the succesful funding of an EU- RTN Marie Curie (MRTN-CT-2005-019335) on "Translocation", together with other nationally-funded projects.

Overall, the the defined goals have been met with the synthesis of novel compounds, their distribution to Action members and their evaluation and characterisation. The momentum created within the Action will continue as laboratory-proven activity of compounds will be taken further for animal studies and subsequent clinical trials for final demonstration of success hopefully leading to the promise to overcome antibiotic resistance in bacteria.

### Action B19 – Molecular cytogenetics of solid tumors

**2000 - 2006**
**Chair: Pr Lidia LARIZZA (IT)**
**Signatories: AT, BE, CZ, DE, DK, ES, FI, FR, GR, IT, LT, MK, NL, NO, PL, PT, RO, SE, UK**

The main objectives of COST Action B19 were to build up a network among scientists and laboratories involved in molecular cytogenetic research of solid tumours and diagnostic services, where applicable, to produce synergic efforts towards the development of new reagents and technologies for the analysis of different tumour types and the subsequent transfer of important breakthroughs into diagnostic services to improve on speed and efficiency of tests with prognostic and diagnostic value, as well as monitoring tumour progression and responses to therapeutic intervention.

The interaction between members of COST B19 led to the development of a web page (http://www.costb19.net) and the launching of a database of departments/laboratories in Europe involved in molecular cytogenetics of solid

tumors, previously lacking from Europe. This directory is of paramount importance and constitutes the source of important documents and recommendations till to complete guidelines to be employed in the diagnostic services and research.

The database is continuously updated and contained information serves a number of purposes:

• Initiate collaborative cytogenetic studies related to specific tumor types, in particular rare tumors, in order to be able to collect a sufficient number of cases to permit valid conclusions as regards the cytogenetic profile and/or specific rearrangements.

• Initiate collaborative molecular genetic studies in order to characterize recurrent structural cytogenetic aberrations at the molecular level.

• Initiate collaborative clinical studies on associations between genetic changes and clinical parameters, including response to therapy and survival, requiring large patient materials treated uniformly in order to obtain sufficient statistical power in the analyses.

• Exchange of materials and experience on technical procedures to overcome problems inherent in the preparations of specific tumour types, e.g., culture conditions, media compositions, cell lines.

• Establish networks of scientists interested in specific tumour types, including exchange of young scientists.

The web page contains also important statistical data (available on line at http://www.costb19.net/cgi-bin/awstats.pl?config=costb19.net&lang=en).

The different hyperlinks created within the page boost the connectivity between interested members in Europe.

The fruitful contacts and collaborations are attested by a total of ~250 joined publications and have favoured scientific discussion on common research themes which are under proposal in the seventh EU framework programme, with the view of creation of joint proposals.

Additional benefit within COST B19 stems from (1) the strengthening of COST Action workgroups with manufacturers selling reagents for molecular cytogenetics and (2) the contact of the Action's Workgroups with European committees for bioethics. It is important to note that some members of the Action participate in the European Leukemia Net, a large European Consortium of the FP6 framework.

## Action B20 – Mammary Gland development, function and cancer

**2001 - 2006**
**Chair: Pr Antonella BALDI (IT)**
**Signatories: AT, BE, BU, CH, CY, CZ, DE, DK, ES, FI, FR, GR, HU, IE, IL, IT, MT, NL, NO, PL, SE, SI, UK**

The main objective of COST B20 was to apply fundamental science and new technologies to the study of mammary gland function in normal and disease condition, resulting in the generation of new therapeutics protocols, in the interpretation of epidemiological data on breast cancer and mammary gland infections, in the development of sustainable, welfare-friendly agriculture. A second objective was to promote exchanges between the research groups in the areas of (1) mammary gland development, function and neoplasia and (2) milk components, nutrition and health.

Action B20's scientific output extends knowledge of mammary biology and breast cancer, more specifically on

• the cellular components of the tissue which have been definitively characterised

• the nature and function of mammary stem cells,

• the intracellular signalling mechanisms, especially those involved in control of the cell population by apoptosis.

COST B20 succeeded on the quality of science it attracted in its membership and to its meetings, which may be difficult to bench-mark, but may be evident in the size of audiences attracted to the Action's meeting, in the willingness of eminent scientists to engage with the Action, and in the readiness of other organisations to hold meetings jointly with the Action.

A major asset of the Action was its ability to create a truly inter-disciplinary forum encompassing themes as diverse as the mammary immune response, the epidemiology of breast cancer risk, the genetic indicators of cancer prognosis, the basis in intracellular signalling of breast cancer aetiology, and the role of diet, and dietary components in disease prevention and complementary therapy. COST B20 provided a bridge between animal scientists and networks of clinical scientists and epidemiologists, from both academia and industry and managed to create the multi-centre "Mammary Proteome" initiative, which will apply proteomics to characterise normal and diseased mammary phenotypes.

A substantial publication record, including some 60 joint papers by Action members, demonstrates direct and productive collaboration.

Action B20 has catalysed the translation of informal collaboration into EU-funded projects, like a successful Fr V Research Training Network (RTN) on "Mammary Development Mechanisms and their Relation to Breast Cancer Progression" and a Fr VI RTN on "Mammary Cell Biology and Gene Expression"); other examples of collaborative projects include nationally-funded projects from France, Austria, Hungary and Sweden.

Overall, COST B20 has met its initial aims, has adapted to focus strongly on breast cancer, and has retained engagement of the animal scientists who founded the Action. It achieved training and scientific innovation, aims which will be further realized as knowledge disseminates across academic networks and into commercial practice. The one tangible outcome is the emergence of a strong scientific community in "mammary biology", embracing both founder countries and laboratories, and also new members, in many cases in new member states of the Union, attracted by the quality and vitality of the network's science.

# Chemistry and Molecular Sciences & Technologies

## Action D17 - Oligomers, Polymers and Copolymers via Metal Catalysis

**1999 - 2006**
**Chair: Dr Claudio BIANCHINI (IT)**
**Signatories: AT, BE, CH, CZ, DE, ES, FI, FR, HU, IT, LV, NL, NO, PL, PT, RO, TR, UK**

The main objective of COST Action D17 has been an increase of the understanding of the principles of oligomerisation, polymerisation and co-polymerisation of unsaturated hydrocarbons via metal catalysis combining efforts of both academics and industries for a sustainable development of the European chemical industry. The final goal was the discovery of a new generation of single-site transition metal catalysts for the selective transformation of alkenes and alkynes into polymeric materials with improved performance parametres through less costly and environmentally friendly manufacturing procedures.

The research programme carried out under Action D17 has embraced several major problems of polymer chemistry and technology, such as co-polymerisation of olefins with carbon monoxide, novel controlled radical polymerisations, metallocene-initiated polymerisation of olefins, and machine-coupled with chemistry post-modification of polyolefins, just to mention a few highlights. Special focus has been placed upon the formation of multiphase and multicomponent polymers, such as polymer blends, nanocomposites, and hybrid materials. To attain these goals, Action D17 has pursued new synthetic methods, sometimes called precision polymerisation, that might enable the fine control of macromolecular architectures. A key to this challenge was envisaged in the design and development of new catalysts and initiating systems, and the new polymerisation mechanisms that shall result from them.

Research groups from sixty six scientific institutions have closely collaborated within COST Action D17 and the results obtained by this network comprise a multitude of research papers in peer-reviewed journals as well as several patents.

## Action D18 - Lanthanide Chemistry for Diagnosis and Therapy

**1999 - 2006**
**Chair: Pr Silvio AIME (IT)**
**Signatories: AT, BE, CH, CY, CZ, DE, ES, FI, FR, GR, HU, IT, LV, NL, NO, PL, PT, RO, SK, UK**

The main objective of COST Action D18 has been to increase the knowledge of the chemistry of lanthanide(III) chelates and to apply this knowledge to the development of novel diagnostic agents and to therapy through an interdisciplinary approach that, starting from chemists, has involved physicists, biologists and physicians.

The main achievements of this Action are the following:

- High sensitive luminescent lanthanide complexes that can be used as sensors in bio-medical assays and as probes in Molecular Imaging studies.
- Improved Gd-based contrast agents for Magnetic Resonance Imaging, MRI, applications thanks to an in-depth understanding and control of the determinants of their proton relaxation enhancement properties.
- Novel targeting and responsive lanthanide-based agents for MRI detection and diseased tissues and organs, including the set-up of the innovative contrast-enhancing procedure based on Chemical Exchange Saturation Transfer.
- Use of radio-lanthanides in therapy utilizing their radiation properties as radioisotopes for endoradiotherapy or induced by external radiation.

The scientific and technical cooperation within the Action has resulted in a high number of joint publications and numerous scientific exchanges among the member teams. The collaboration within D18 has allowed creating a scientific community able to integrate research teams with different levels of skill and expertise. The links established among D18 members constitute an important contribution to build the European Research Area. Along the years, the close collaboration within D18 has granted full access to specialised equipment and methodologies that were available only in few laboratories. This collaboration will continue beyond Action D18 as several former member groups are currently involved in the activities of two NoEs approved in the field of Molecular Imaging.

## Action D19 - Chemical Functionality Specific to the Nanometre Scale

**2000 - 2006**
**Chair: Pr Rolf HEMPELMANN (DE)**
**Signatories: AT, BE, CH, DE, DK, ES, FR, HR, HU, IE, IL, IT, LT, LV, NL, PL, PT, RO, SI, TR, UK**

The main objective of COST Action D19 was to investigate the effect of nano-structural features on chemical properties.

There was particular interest in answering questions such as "how are chemical reactivity or selectivity influenced by the size, shape or ordering of the pores or of the particles themselves?" and "how does the ordering of molecules or macromolecules in the pores influence these properties?" Since the provisions of answers to these questions required a wide range of techniques, a fundamental, interdisciplinary approach has been taken. The materials studied are of prime importance and were chosen with respect to the respective chemical functionality/ functionalities together with the corresponding application in question.

Action D19 has carried out research on the following topics:

• Functionalised nanoparticles and nanostructured materials of transition metal oxides, especially Titanium(IV) oxide and magnetic materials

• The physico-chemical processes occurring at the interface of inorganic/polymer nanocomposites.

• The stereochemical effects on self-assembly and switching at the nanometre scale

• The chemical reactivity of metal oxide nanostructures

• Supported semiconductor nanosized catalysts for photo-chemical organic pollutant degradation

• The formation and investigation of super-hydrophobic surfaces at nanometre and micrometre scale roughness

• Design, preparation and control of nanodevices using light.

• The development of new nanostructured functional materials

The research of groups from 43 different institutions belonging to 20 countries has been coordinated under Action D19, which has resulted in the publication of a multitude of scientific articles in peer-reviewed journals.

## Action D20 - Metal Compounds in the Treatment of Cancer and Viral Diseases

**2000 - 2006**
**Chair: Pr Enzo ALESSIO (IT)**
**Signatories: AT, BE, BG, CH, CZ, DE, DK, ES, FI, FR, GR, HU, IE, IL, IT, NL, NO, PL, RO, SE, SI, TR, UK**

The main objective of COST Action D20 was to further develop the chemistry of metal-containing compounds to be applied in cancer chemotherapy and eventually in antiviral therapy.

Among the many scientific achievements of the Action, it is worth noting that two ruthenium compounds and a gallium compound developed within COST D20 have reached the phase of clinical trials in humans as novel anticancer agents. The first ruthenium compound, termed NAMI-A, has accomplished phase 1 clinical trials and entered phase 2 in 2006. NAMI-A was the first ruthenium compound ever to reach the stage of evaluation on humans. The second ruthenium compound, KP1019, has also completed a phase 1 clinical trial. These accomplishments have involved the establishment of connections with several European industrial companies.

At a more fundamental level, the following scientific achievements of D20, among many others, may deserve to be highlighted:

• the investigation of the interactions of new potential antitumor platinum compounds with cellular components and their biological consequences. In particular, assessment of the distortions induced in DNA by these compounds, and recognition and repair of these distortions by specific proteins.

• the development of novel organometallic anticancer compounds and, in particular, of a class of ruthenium(II) arene complexes that specifically target guanine bases of DNA oligomers and form monofunctional adducts.

• the development of potential "supramolecular metallo-drugs", i.e. polycationic cylindrical or spherical metallo-agents of appropriate size and bearing surface recognition functionality that recognize the major groove of DNA through supramolecular interactions.

Action D20 has been instrumental in the creation of excellence in Europe in the field of anticancer metal compounds, with a very high level of scientific activity. COST D20 has allowed its members to adopt world-leading positions in the field and establish new contacts with industry, especially SMEs. The scientific results have been presented in a large number of publications in refereed journals and through the plenary lectures that members of the Action have been invited to give at major international conferences. The educational impact of Action D20 became evident in a special session of the Final Conference of the Action, entitled 'Raised in D20', where several young scientists who had done their doctoral or postdoctoral work within the Action and had benefited from scientific exchanges presented their results.

## Action D21 - Metalloenzymes and Chemical Biomimetics

**2000 - 2006**
**Chair: Pr Luigi CASELLA (IT)**
**Signatories: AT, BE, CH, CZ, DE, DK, ES, FI, FR, GR, HU, IE, IL, IT, MT, NL, NO, PL, PT, SE, UK**

COST Action D21 was conceived with the aim of increasing the knowledge of the chemistry of metal sites in proteins to strengthen their application to chemical, biotechnological, pharmacological and environmental sciences.

Among others, significant achievements of Action D21 are the systematic investigation of the human heme peroxidase family, which has established the complete array of reactive oxidants that mediate halogenation, nitr(osyl)ation and oxidation of cellular components such as lipids and proteins. These reactions explain the potential to inflict tissue damage and to induce inflammation, and their better characterisation will facilitate the development of drugs targeted to diseases such as cardiovascular disease, neurodegenerative disorders and asthma. In parallel, the engineering and biophysical studies on a broad set of plant heme peroxidases have provided a full account of the specific structural effects ruling the activity of the enzymes, the clarification of their catalytic mechanism, and have opened new applications in biotechnology as well as in the industrial and medical applications of these enzymes. The field of protein-protein interactions has gained an important advancement by the development of new computational algorithms that, in combination with experimental techniques, allow to understand at a molecular level the structural basis of the specificity of inter-protein interactions. The programme has been made available to the scientific community on request.

The study of biomimetic model compounds has enabled to dissect the steps involved in the pathway of enzymatic oxidation by tyrosinase, the enzyme responsible for tissue melanization, and reproduce the chemistry exhibited by other metal oxygenases, oxidases and catalases. In addition, the direct observation of enzyme-inhibitor complexes through sophisticated spectroscopic techniques has clarified the mechanism of interaction of the small molecules at the active site of tyrosinase.

Important progress has been made on the way in which redox proteins/enzymes function and how their properties can be modified. Immobilization on solid supports with new techniques has allowed a literally close look at the immobilized bio-molecules. A detailed understanding of how a single enzyme works is within reach and will provide additional valuable information over the knowledge that can be gained from studies on statistically large ensembles of molecules. D21 has coordinated the collaboration of 110 research groups from 20 different countries. The obtained scientific results have been disseminated through a large number of workshops and meetings as well as by the publication of a very large number of articles in prestigeous peer reviewed journals.

## Action D22 - Protein-lipid Interaction

**2000 - 2006**
**Chair: Pr John FINDLAY (UK)**
**Signatories: AT, BE, CH, DE, DK, ES, FI, FR, GR, HR, HU, IT, LV, NL, PL, PT, SE, SI, UK**

COST Action D22 was conceived with the aim of increasing the knowledge of protein-lipid interactions on molecular level and time scales, based on an interdisciplinary approach by chemists, physicists and biologists. This COST Action has allowed the collaboration between 36 research groups from 18 different countries.

Protein-lipid interactions are essential features of biological membranes, nevertheless many questions related to the chemistry and physics of lipids and proteins are still not understood nowadays. The lack of proper understanding of molecular mechanisms important for the functioning of biological membranes also hinders practical industrial applications. The scientific goals of Action D22 can be summarised as follows: integration of chemical and physical knowledge of biological membranes and protein-lipid systems; better understanding of molecular processes and time scales important for the functioning of biological membranes, with emphasis on structural aspects of lipids and proteins, protein association and membrane domain formation using different membrane model systems; and reinforcement of research efforts by links between academic institutions and industries.

Molecular simulation has developed substantially over the time-frame of Action D22. Initially considered a rather inexact and unreliable approach, the sophistication of the methodology has improved significantly to the point that such studies suggest interesting structure/function relationships and mechanisms of action which are a great stimulus to experimentation. The Action has attracted physicists as well as theoretical chemists and computational biologists, making for interesting diversified views on essentially the same system. D22 has also incorporated bioinformatics and it has been from this that the most significant "tour-de-force" has come with the identification of the cellular locations of the C-terminal regions of almost all membrane proteins encoded by the genomes of Escherichia coli and Saccharomyces cerevisiae. Considerable progress was also made through simulations of the mechanisms of insertion of peptides and proteins into the lipid bilayer, and their interactions with and effects on lipid behaviour.

Action D22 has undertaken as well the characterisation of raft-like domains in model membranes by fluorescence microscopy and spectroscopy allowing the construction of phase diagrams and the characterisation of the dynamics of raft-like domains. Using EPR, the first direct demonstration of liquid-ordered/liquid-disordered phase coexistence in a binary mixture was demonstrated. NMR, calorimetry and EPR studies gave new insights into the interactions between raft components, such as the effect of cholesterol on the lateral diffusion of lipids and the specificity of the

interactions between sphingolipids and cholesterol.

Methodology has also been developed for the use of time released FRET for lipid domain size, for the preparation of giant unilamellar vesicles from native membranes and for reconstituting integral membrane proteins into these vesicles. By employing single molecule microscopy, movement, cluster formation and co-localization of molecules was investigated and a novel single molecule technology was established for measuring the composition of individual lipid rafts in intact cells.

## Action D24 - Sustainable Chemical Processes: Stereoselective Transition Metal-Catalysed Reactions

**2001 - 2006**
**Chair: Pr Pat GUIRY (IE)**
**Signatories: AT, BE, CH, DE, DK, ES, FI, FR, GR, HU, IE, IT, LV, MT, NL, NO, PL, PT, RO, SE, SI, UK**

The aim of Action D24 was to develop new transition metal-catalysed reactions with special emphasis on stereoselectivity to strengthen their application in chemical, biotechnological, pharmacological and environmental sciences. This objective was pursued by research to discover new transition metal-derived catalysts which provide high activity and enantioselectivity for a number of organic transformations. Transition metals compare very favourably as catalysts due to their non-toxicity, stability to various reaction conditions and ease of preparation and handling. Furthermore, the reactivity and selectivity of the metal catalyst can easily be tuned and refined by complexation to an organic ligand which makes it possible to design and test catalysts for a specific purpose and primarily those of importance to synthetic chemists.

Among a large number of achievements, D24 has developed a new type of palladium-catalysed pseudo-domino process as a new synthetic route to pyrrolidones. A new palladium-catalysed synthesis of sulfoxides via addition of sulfenate anions has also been developed. An air-stable equivalent of trimethyl aluminium that is being applied in asymmetric methylations has also been produced and is now sold commercially. Action D24 has also focused on the synthesis of new chiral nitrogen-containing ligands for asymmetric catalysis and as a result of these studies a new synthetic procedure for the preparation of o-substituted triarylphenols has been developed. The application of new ligands in asymmetric heterogeneous catalysis, particularly asymmetric hydrogenation, has also been the subject of intensive studies by this Action. D24 has also greatly contributed toward the development of ruthenium chemistry for stereoselective organic synthesis, with particular emphasis on reactions which proceed with atom economy and improved efficiency, stereoselectivity, and eco-compatibility.

Action D24 comprised members from more that 80 research institutions belonging to 22 different countries. The scientific achievements of D24 have been disseminated largely through various Action-organised 'Stereocat' workshops, numerous presentations at other international conferences, and a vast number of research papers published in peer-reviewed journals.

*Management Committee meeting Action 542, 13 July 2006*

# Earth System Science and Environmental Management

## Action 625 - 3-D monitoring of active tectonic structures 2000-2006

**2000 - 2006**
**Chair: Dr Luigi PICCARDI (IT)**
**Signatories: AT, BE, BG, CZ, DE, DK, ES, FR, GR, HR, HU, IT, LU, LV, PL, RO, RS, SI, SK, UK**

The main goal of the Action was the 3D monitoring of micro-displacements on active tectonic structures. This requires establishing and networking local monitoring points on selected fault planes in tectonically active regions. Data on detailed 3-D micro-displacements was interpreted, providing a new opportunity to detect long-term trends, and other characteristics, and to find correlations with other scientific findings and known regional measurements. The results will help to minimize hazards coming from earthquakes and minor tectonic movements endangering construction projects such as pipe lines, roads and bridges. Research advances occurred in two main fields:1) studying and understanding the kinematic, mechanics and seismic behaviour of active tectonic structures and 2) establishing monitoring networks in the field.

This Action formed more than 10 networks in the area of monitoring and evaluation of tectonic deformations that will be useful for future collaboration between European laboratories. It also established more than 25 monitored structures in active regions of the territories of PL, CZ, D, SK, BG, GR, I, SLO and E. International co-operation took place at meetings and in the field, where 93 3D crack gauges where in operation (55 of these were installed during the action). More than 5 networks were covered with high precision GPS. Resulting 3D gauge monitoring data were evaluated centrally in Prague, CZ and GPS data centrally in Wroclaw, PL and Granada/Jaén E. Results were made available to all the partners. An exchange of information on research needs and on-going research activities in Europe related to this research field was a key Action achievement.

Results were presented in scientific congresses and publications, and diffused through specific workshops and a web site organized by COST Action 625.

## Action 627 - Carbon storage in European grasslands

**2000 - 2006**
**Chair: Pr Mike B. JONES (IE)**
**Signatories: AT, BE, CH, CZ, DK, ES, FI, FR, DE, HU, IE, IS, IT, LT, NO, SI, UK**

The main objective of the Action was to quantify, through experimentation and modelling, carbon storage in European grassland ecosystems and to identify the mechanisms controlling carbon allocation in plants and soils of grasslands. This quantification allows an assessment of the contribution that European grasslands make to the total biosphere sinks for carbon under different forms of management in a changing environment. Management variables included nutrient inputs, and cutting or grazing practices and land use changes. Environmental trends included increasing atmospheric CO2, O3 and reactive nitrogen (NOx,NH3), rising temperature and changed patterns of rainfall.

This Action undertook quantifiable assessment of the ability of grasslands in Europe to sequester carbon and gave an indication of the long-term stability of the sequestered carbon. The results can help formulate land management policy to optimize the capacity of grasslands as carbon sinks. The Action also improved understanding of the carbon storage and circulation in plants and solids, and efficient mechanisms for its control.

A variety of scientific publications resulted from the Action's activities.

## Action 629 - Fate, impact and indicators of water pollution in natural porous media at different scales

**2001 - 2006**
**Chair: Mr Per AAGAARD (NO)**
**Signatories: AT, BE, BG, CH, CY, CZ, DE, DK, ES, FR, GR, HR, HU, IE, IL, IT, LT, MT, NL, NO, SK, UK**

The objective of the Action was to improve the science underpinning the development of integrated indicators of the environmental risks created by pollutants in water. The emphasis was emphasis on water bodies on natural porous media. Natural porous media include soils, subsoil vadose zones, and aquifer systems. The pollutants considered

were substances of anthropogenic origin such as nutrients, pesticides, hazardous substances, organic chemicals and solvents, organometalic, radionucleic and organic waste. Where these substances occurred in concentration considered toxic to living organisms, pollution was deemed to exist. Under this COST Action an effort was made to address both the "known" and the "unknown" fraction. A set of integrated indicators to evaluate pollution status and risk of toxicity for European water resources will aid environmental agencies, administrators and regulators and benefit society as a whole. The developed tools will facilitate implementation of the EU Water Framework Directive (WFD).

## Action 631 - Understanding and Modeling Plant-Soil Interaction in the Rhizosphere Environment

**2001 - 2006**
**Chair: Mr Phillipe HINSINGER (FR)**
**Signatories: AT, BE, BG, CH, CY, CZ, DE, DK, ES, FI, FR, GR, HU, IL, IT, NL, NO, PL, SE, SI, SK, UK**

The objective of this Action was to enhance knowledge, methodology and models of rhizosphere processes. Emphasis was on dynamic feedback loops between plants and soil in natural, agricultural and forest ecosystems, including contaminated ones. This Action focused on collecting, evaluating and categorizing the available, scattered data on rhizosphere processes and building a joint European database. Methods for rhizosphere research, and for solving key scaling problems, were compared, evaluated, categorized and harmonized. The Action fostered the development of new methodologies, including molecular biology-based ones, to study rhizosphere processes with emphasis on in situ approaches. Areas for further research relating to rhizosphere processes, which could benefit from a European approach, were identified. Processes operating in the rhisosphere, which are very sensitive to environmental changes caused by the pollution, are better understood due to the Action's efforts.

The database of models has successfully gathered published models relevant to rhizosphere research. A major effort has been made to identify multi-component models that adequately incorporate all possible rhizosphere interactions, at the scale of a single root. This was the focus of a multi-authored publication in Plant and Soil. The Handbook of Methods in Rhizosphere Research is another achievement of the Action, gathering a total of 240 method sheets that are relevant to the specific properties and scale of the rhizosphere. No such book has ever been published, to the best of our knowledge. This unique compilation shall be useful for the entire community of scientists working on the rhizosphere, and particularly for new comers in this domain. Another major success was the organisation of a Training School on the Modeling of Rhizosphere Processes in 2005.The International Conference RHIZOSPHERE 2004 held in Munich was another key success of COST Action 631 –which played a key role in the organisation of this event, attended by 480 participants.

## Action 719 - The Use of Geographic Information Systems in Climatology and Meteorology

**2000 - 2006**
**Chair: Pr Hartwig DOBESCH (AT)**
**Signatories: AT, BE, CH, CY, DE, ES, FI, FR, GR, HU, IT, NL, NO, PL, PT, RO, SE, SI, UK**

Action 719's objective was to broaden and enhance the potential of GIS to advance research in the fields of climatology and meteorology. New applications were developed with the emphasis on the procedures and capabilities for integrating and adding value to data from various sources. Applications relating to control and presentation of climate and other related data were also developed. The Action fostered European cooperation in the development of operational GIS applications in meteorology and climate research and strengthened links between National Meteorological Services, the research community and GIS industry.

The more detailed objectives included: regularly assess the state-of-the-art of GIS tools (software/hardware) and developments in progress, assess the availability, content and accessibility of meteorological, climatological and other relevant data sets; and assess the potential and limitations of GIS (interpolation) tools for spatialisation of meteorological and climate data. Action dissemination efforts informed a range of users, scientists, technologies suppliers and data providers about both existing expertise and the results of the Action itself. Other Action outcomes included b-testing of ArcGIS 9.2, questionnaires on the use of GIS software in the meteorological and climatological community, participation in projects like UNIDART and Land-SAF and active participation in the INSPIRE initiative. In spite of some obstacles, an inventory of data programmes and available geographical datasets was prepared. The Action successfully compared spatialisation algorithms for several meteorological elements, from several countries, in different scales (mean monthly air temperature, daily minimum and maximum temperature, precipitation totals and extreme precipitation totals, surface wind power density, surface wind velocity, air pollution and air quality, global radiation, sunshine duration and cloudiness, snow cover depth, various climate indices and phenological data). The Action carried out a comparative analysis of different interpolation methods for main meteorological elements (air temperature, precipitation totals). A literature review of previous studies on inter-comparisons of interpolation methods was also produced. The scientific results of the Action 719 have appeared in 14 scientific contributions.

## Action 720 - Integrated ground-based remote sensing stations for atmospheric profiling

**2000 - 2006**
**Chair: Dr Wim A. MONNA (NL)**
**Signatories: AT, CH, DE, ES, FI, FR, GR, IT, NL, PL, PT, UK**

The main objective of the action was the development and assessment of cost-effective integrated ground-based remote-sensing stations for atmospheric profiling. Assessments measure the usefulness of the stations for meteorological analysis and forecasting, as well as climate research and climate monitoring. Integrated remote-sensing stations can be used for synoptic-scale numerical weather prediction (NWP), mesoscale NWP, boundary-layer research, air-polution monitoring, and air-traffic control. For most types of use, the full benefit of these stations can only be obtained by establishing international networks. Ground-based remote-sensing techniques compliment existing measurement techniques using satellites, commercial aircraft and radiosondes. Essential for the success of the Action were the datasets provided by a number of international field experiments. Increasing collaboration and mutual understanding of single sensor experts throughout Europe during the Action was seen. Improved networking, also with other ongoing programmes, was emphasized by this Action, strongly contributing to the development of techniques for integrated multi-sensor measurements of high resolution atmospheric profiles in Europe. Another important more abstract result was the fruitful exchange of ideas between researchers with data assimilation experts from the NWP world. During this Action, valuable datasets were produced through various field campaigns: TUC (Payerne), LAUNCH (Lindenberg), CSIP (Southers UK), testbed campaigns (Helsinki) and WMO radiosonde intercomparison (Vacoas). Results and analysis of the TUC field experiment were published in a special issue of Meteorologische Zeitschrift. This Action made important contributions to the development of techniques for integrated profiling systems, assessment of assimilation techniques for humidity and cloud profiles, impact studies on ground-based networks of high-resolution profiling stations and a proposal for a BUFR code for integrated profiling stations.

## Action 723 - Data Exploitation and Modeling for the Upper Troposphere and Lower Stratosphere

**2002 - 2006**
**Chair: Dr William LAHOZ (UK)**
**Signatories: AT, BE, BG, CH, CY, CZ, DE, DK, ES, FI, FR, GR, IT, NL, PL, PT, SE, UK**

The main objective of the Action was to advance understanding of the state of the global upper troposphere and lower stratosphere (UTLS), and the role of the dynamic, chemical, and radiative processes in this altitude region, in order to provide an improved basis for policy advice in connection with global change. Action 723 provided value-added quality-controlled datasets of geophysical parameters (e.g. ozone and water vapour) which are important for the study of radiative, dynamic, and photochemical processes in the tropopause altitude region (5km above and below the tropopause). Hitherto, there has been little information on these geological parameters in this region. The Action contributed to ward making the best use of observations, models and assimilation algorithms, and towards the definition of new strategies for future research. Assessment of UTLS measurement capabilities showed that ozone is reasonably well covered by existing databases (NDSC, GAW and WOUDC). The most prominent open issue on the global scale was found to be the inconsistency and uncertain quality of different humidity data sets. The Action assessed the quality of the different datasets by intercomparison studies, including direct in situ comparisons, as well as comparisons using satellite instruments as a transfer standard. To improve the quality of radiosondes, a measurement campaign (LAUTLOS) was carried out. Results of the campaign were discussed at a dedicated expert meeting. The opportunity offered by the EOS Aura satellite as a transfer standard was used to compare measurements of the different existing or emerging lidars.

For an assimilated Ozone and Humidity Dataset three approaches were identified: 1) assimilation into a NWP model based on a General Circulation Model (GCM), 2) assimilation into a CTM and 3) assimilation into a coupled GCM/CTM model. The Action organized a workshop on cirrus clouds. The Action is producing two journal special issues: Atmospheric Chemistry Physics/Atmospheric Chemistry Physics (ACPD/ACP), Quarterly Journal of the Royal Meteorological Society (QJRMS).In addition, a proposal for a follow-up COST Action entitled "Atmospheric Water Vapour in the Climate System was build" has been successful.

# Food and Agriculture

## Action 845 - Brucellosis in Animals and Man

**2000 - 2006**
**Chair: Dr David O'CALLAGHAN (FR)**
**Signatories: BE, CY, DE, DK, ES, FI, FR, GR, IE, IL, IT, LT, MK, NL, NO, PL, PT, RS, SE, UK**

The Action organised several meetings and symposia, sometimes organised together with international conferences. There were almost no books of abstracts or proceedings (except for the larger conference) produced from these meetings. Detailed STSM reports are not available. Members of COST 845 produced a large number of publications in the area of brucellosis research covered by the Action. The original chair of this Action resigned in 2005 leaving it in a moribund state. Special mention must be made of the efforts made by the rapporteur (Professor Peter Raspor) and the COST office to have a new chair elected. This was achieved succcessfully, and the new chair (Dr. David O'Callaghan) is to be congratulated in bringing the Action back to life and to concluding it successfully under these very difficult circumstances.

## Action 846 - Measuring and Monitoring of Farm Animal Welfare

**2001 - 2006**
**Chair: Dr Harry BLOKHUIS (NL)**
**Signatories: AT, BE, BG, CH, CY, CZ, DE, DK, ES, FI, FR, GR, IE, IL, IT, NL, NO, SE, SK, UK**

This COST Action has successfully delivered on its project's objectives. The Action project team had 37 members from 17 different countries. Consequently, COST Action 846 has been extremely effective at improving and encouraging research co-ordination across Europe. The completion of a series of Short Term Scientific Missions by individuals from 9 different countries will aid the dissemination of research methods and also help develop the level of expertise in this research area across Europe. The management team are to be commended for maintaining the project's momentum throughout its duration. Specific comments relating to the delivery of each project objective are provided below and these outline areas where the provision of further information and clarification would have been beneficial. The report also includes recommendations on some technical aspects of this project.

## Action 849 - Parasitic Plant Management in Sustainable Agriculture

**2001 - 2006**
**Chair: Pr Diego RUBIALES OLMEDO (ES)**
**Signatories: AT, BG, CY, DE, DK, ES, FR, GR, HU, IL, IT, NL, PT, RO, RS, SK, UK**

Parasitic plants are becoming severe constraints to Mediterranean and Tropical agriculture on major crops and the efficacy of available means to control them is minimal.

The main objective of this Action was to increase the understanding of the interaction between parasitic plants and their hosts in order to implement sustainable means of control.

COST 849 allowed, for the first time, the coordination of research on parasitic weeds within Europe and associated countries. This brought about new collaborations in some key issues: accelerating the genomic study of host-parasite interaction; developing new means to increase efficacy of biocontrol agents against broomrape species, developing the first steps toward standardisation of race identification for Orobanche cumana, and development of a draft sanitation protocol for the prevention of further spread of broomrape seeds in agricultural areas. This is mainly expressed, in the short term, by joint scientific publications, but in the long term it allowed the acquaintances needed for joint research proposals. Several joint research proposals have already been submitted by COST 849 members (like LEGMORO in 2002), some have been granted financial support, e.g. GLIP which is currently EU-FP6 funded and examines host-parasite interrelations for the development of new resistances against broomrape in legumes.

## Action 850 - Bio-control Symbioses (Symbiotic Complexes for Biological Control of Pests)

**2001 - 2006**
**Chair: Pr Ralf-Udo EHLERS (DE)**
**Signatories: AT, BE, BG, CH, CZ, DE, DK, ES, FI, FR, GR, HU, IE, IL, IT, NL, NO, PL, PT, SE, UK**

The objective of this Action was to develop a better understanding of the interactions taking place in those biocontrol symbioses that may be used against insects and slug pests in biological control in Europe.

A network was built drawing together specialists working on insects and molluscs, on endocellular symbionts and on extracellular symbionts. The interests of this diverse interdisciplinary group meet on the mechanisms by means of which symbiotic organisation is maintained on:

• how the symbiotic partnership gains fitness

• what new molecules may be involved

• how symbioses may be exploited for biological pest control, and

• how results may be exploited by sustainable agriculture and biotechnology

The Action has reached its goals, the initiation of internal and external communication, an increase in the use of biocontrol symbiosis in integrated pest management systems and acceleration of progress in R&D in fundamental and applied science. This Action 850 followed 2 previous Actions 812 and 819 also on Entopathogenic Nematodes (EPN). When Action 812 started, the center for R&D and use of EPN was the United States of America. Today three producers using advanced biotechnology are situated in Europe and provide EPN products for the rest of the world. This is an excellent basis to further accelerate the introduction of EPN and biocontrol symbiosis into biological control.

Private enterprises were integrated at an early stage. Several SMEs producing or marketing EPN in biological control have emphasised the benefits they received from the activities of COST 850. R&D helped the SMEs to develop new markets for EPN, to improve production, storage and formulation and particularly to agree on quality control standards. The communication between the companies and academia was greatly enhanced to the benefit of both sides.

This COST Action organised the joint opposition of industry, research, extension services and grower organisations regarding the plans of EU SANCO (responsible for registration of plant protection products) to include EPN in the group of micro-organisms, which would have made necessary a costly and time-consuming registration procedure according to Directive 91/414 ECC. As related costs often surpass potential sales in niche markets, the consequence would have been that most EPN products would have disappeared from the market.

This COST Action also organised technology transfer meetings. One working group meeting was organised with hazelnut growers in France to plan cooperation for the development of biocontrol of the nut weevil Balaninus nucum. Another was held in Wellesbourne with international participation to introduce using EPN in controlling mushroom pests. This meeting was held in English and Spanish. The major problem on this level of technology transfer to users was the difficulties of the participants understanding the English language.

## Action 851 - Gametic cells and molecular breeding for crop improvement

**2001 - 2006**
**Chair: Dr Brian Peter FORSTER (UK)**
**Signatories: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GR, HU, IE, IT, LT, LV, NL, NO, PL, RO, SE, SI, SK, UK**

The main objective of this Action was to discover the biological controls of gametic embryogenesis and to exploit these in plant breeding. In doing so the Action would help Europe to maintain its lead in this area both in fundamental studies and in its commercial exploitation.

This COST Action placed the technology of gametic embryogenesis on a firm scientific basis and in doing so provided support for the resurgence of interest in haploids/doubled haploids in higher plants. The science involved basic research in double haploidy technology; functional genomics in gene discovery, gene expression and developmental studies. The research targeted a wide range of species including all the major European crop groups: cereals, vegetables, fruit, as well as medicinal plants and ornamental species.

There has been a steady transition in moving species off the recalcitrant category onto the responsive category. The transfer of technology from the model species to others has been a significant factor in expanding the use of doubled haploidy to new species. Woody species and legumes however remain difficult groups.

One of the highlights of this Action with respect to knowledge transfer was a joint venture with the Food and Agriculture Organisation (FAO) and the International Atomic Energy Agency (IAEA) of the United Nations (UN) in the publication of an important book with protocols for Doubled Haploids induction in a wide range of crop species, entitled “Doubled Haploid Production in Crop Plants - A Manual” This book is of great importance and serves as a reference book for scientific and applied studies, and for breeding programmes and breeders. It is used in FAO/IAEA inter-regional training programmes.

Dissemination of the results was also managed by organising workshops together with the European Plant Breeding Organisation (EUCARPIA).

The Action attempted to maximise the involvement and collaboration between plant breeders. This was tackled head on with one of the Working Groups being chaired by two people from different plant breeding companies. The speed of change and the challenge from out side Europe also put pressure on plant breeders to share information. A notable example of this is the joint publication on “Molecular markers and doubled haploids in European Plant Breeding”, which involved collaboration between plant breeding companies in Sweden, Finland, Germany and Austria. This is exceptional given that innovative methods are normally difficult to report on as these are often put forward for patenting.

The transfer of laboratory based innovations to end-user practice was not and is not straightforward, and this COST Action provided an important vehicle for such technology transfer. Short-term scientific missions were considered to be particularly relevant here, as they provide “hands-on” experience. For plant breeders, especially small companies in Europe this was important as they are often remote, both geographically and scientifically.

## Action 852 - Quality Legume-Based Forage Systems for Contrasting Environments

**2001 - 2006**
**Chair: Pr Áslaug HELGADÓTTIR (IS)**
**Signatories: AT, BE, BG, CH, DE, DK, ES, FI, FR, GR, IE, IS, IT, LT, NL, NO, PL, PT, RS, SE, SI, UK**

The main objective of the Action is to increase the quantity and quality of home grown proteins from regionally adapted legume-based forage systems. The potential for legumes to contribute to sustainable agricultural development relates to their ability to (a) reduce the requirements for inorganic N fertilisers derived from non-renewable sources of energy; (b) reduce losses of nitrogen to the environment, (c) reduce the need for imported concentrates, and (d) maintain and improve soil structure and fertility. To achieve this, the action had three working groups, each with its specific objectives and common experimental protocols.

Temporal and spatial variation in legume performance occurs and this restricts the confidence of farmers in legume-based systems.

The main strenght of the Action was the set up of the common experiments and the creation of an extensive network that this entailed. The Agrobiodiversity experiment is the biggest biodiversity experiment carried out worldwide ever with 42 sites in more than 20 countries. It covers a range of climatic conditions in Europe from Greece to Iceland and stretches from Australia to Canada. Data of all the different sites are being assembled in a large database which will form the basis for extensive analyses of the data. The last data will be available after the end date of the Action; therefore the network will continue after the enddate with their data and analyses.

For the data analyses and how to interprete all the results from the common experiments, a training workshop was organised for the participants.

Results have been obtained in the area such as the effects of grass-legume mixtures on plant yield, weed invasion, arthropod communities, soil micro organisms, gaseous N-losses, Nitrate leaching and forage quality. In the common experiments also the effects were studied of genetic diversity within individual plant species on yield and stability and studies were done with cows measuring forage preference and uptake, in addition to the N household of the animal, N excretion of the animal, milk yield and quality.

Preliminary results have been presented and disseminated at a meeting of the European Grassland Federation and at the International Grassland Congress in Dublin in 2005.

The Action managed to attract a number of young scientists that became active in carrying out the experiments and played an important part in setting up various spin-off studies.

This COST network was extremely important for this area of research, because over the years funding for this type of research decreased and through this COST network common experimental work could be initiated (including expensive animal experiments).

## Action 854 - Protozoal Reproduction Losses in Farm Ruminants

**2002 - 2006**
**Chair: Dr Franz J. CONRATHS (DE)**
**Signatories: AT, BE, BG, CH, CZ, DE, ES, FR, GR, IE, IL, IT, LT, NL, NO, PL, PT, SE, UK**

COST 854 contributed to the improvement of the understanding of the biology of the pathogens studied in the Action, e.g. by adapting new typing methods such as microsatellite sequencing to protozoa of interest. The work done on the interaction of some protozoa with the immune system of the pregnant host advanced the knowledge on the pathogenesis of the infections significantly. In summary, COST 854 greatly helped to form and maintain a network of scientists working on protozoa causing abortion and reproduction losses. This network extends far beyond Europe. Moreover, major progress in research into the biology, pathogenesis, immunology, diagnosis, epidemiology and control of the infections studied was achieved through COST 854 as evident from the large number of scientific publications that arose in conjunction with this Action.

## Action 920 - Foodborne Zoonoses: a Coordinated Food Chain Approach

**2001 - 2006**
**Chair: Pr Christopher THORNS (UK)**
**Signatories: AT, BE, CH, CY, CZ, DE, DK, ES, FI, FR, GR, HR, HU, IE, IT, LT, NL, NO, PL, RO, SE, UK**

Human infections arising from the contamination of foodstuffs originating from animals remain a significant public health and economic burden in Europe and much of the developed world. The human enteric infections caused by Salmonella and Campylobacter remain the most common.

The most effective and sustainable approach to controlling these pathogens is to ensure that all those involved in safe food production from the animal to the human patient regularly meet and exchange information so that sound

evidence-based control policies can be developed. The main objective of COST Action 920 was to develop and improve the coordination and communication between experts in the different foodchain sectors in order to improve the coordination and control of foodborne pathogens.

COST 920 has been particularly successful in bringing together the veterinary, food and public health experts that gather information, the scientists that use this information to assess the various risks in the foodchain and the advisors and policy makers who are responsible for managing these risks through control measures and new policies. Meetings have included representatives from the World Health Organisation (WHO), European Food Safety Authority (EFSA) and the Office World Organisation for Animal Health (OIE) who are important international bodies involved in improving food safety. COST 920 has also been invited to participate in WHO training workshops and provide scientific information to EFSA. In addition, the Chair was invited to present an overview of COST 920 at three international scientific conferences and was also invited to the New Zealand Embassy in London to present to New Zealand and Australian officials and scientists.

COST 920 has also been active in training and transferring expertise and technologies within the participating European countries. For example, recognised methods to differentiate and characterise the organisms that cause these diseases such as campylobacter and salmonella have been successfully transferred between countries. This is very important to ensure that the information from one country in Europe can be compared with data from the other countries.

Another very important success for COST 920 has been in helping to train scientists in risk assessment in those countries that lack the skills and expertise. For example, scientists from Hungary, Poland and Romania have been trained in the basics of risk assessment and are now using this knowledge to help to develop this expertise in their own country. Furthermore, COST 920 facilitated the first comprehensive inventory of quantitative microbiological risk assessments (QMRA) in Europe that is now published at: http://cost920.com/00020.html The list is expanding and the most recent revision of the inventory will be published in the proceedings of the final conference.

## Action 922 - Health Implications of Dietary Amines

**2001 - 2006**
**Chair: Dr Heather WALLACE (UK)**
**Signatories: AT, BE, CH, CY, CZ, DE, ES, FI, FR, GR, HU, IT, LT, NL, NO, PL, PT, RO, RS, SE, UK**

The human diet contains significant amounts of amines and amine related compounds that are present either naturally or as a result of food processing or storage.Some of these compounds are known to be hazardous to health, while the dangers associated with others are poorly understood. On the other hand some are beneficial to health. The main aim of this Action was to bring together information from diverse scientific areas and disciplines in order to evaluate the potential risk or benefits to human health of dietary amines.

Over the course of the Action there were several reports of the use of biogenic amines to monitor the quality of food. This was used to monitor quality during storage at appropriate and inappropriate temperatures, under different pressures and after new types of processing. The results all indicated that as the quality of the product decreased the biogenic amine content increased. Although not a linear relationship, it was clear that as sensorial quality declined there was an exponential increase in amines in particular the polyamines, putrescine, spermidine and spermine.

In terms of identifying ways of decreasing biogenic amine content of food it was observed that for fermented products if starter cultures that were low in amino acid decarboxylase activity were used, the biogenic amine content of the products could significantly decrease. These products include mature cheeses, wines and fermented sausages.

With the exception of histamine, there is little evidence of intolerance in the European population to biogenic amines. However, the results recommend that consideration be given to amine load taken in a single meal. For example, in a typical Austrian meal with fermented sausage, cheese and beer the amine load may be very high and likely to induce problems similar to histamine in tolerance.

The interactions between amines and their biosynthetic pathways were addressed and the potential of inhibitors targeted at biogenic amine synthesis to be chemotherapeutic and chemopreventative agents were investigated

Particular success was achieved in establishing models in silico for predicting amine metabolism. The data from the Action has been used to provide the input for the predictive modelling programmes.

Several groups investigated the use of inhibitors of polyamine biosynthesis as anticancer agents. As with all cancer biology there were successes including the potential promise from the polyamine analogues. These analogues are also showing some promise against parasitic diseases endemic to the developing world.

## Action 923 - Multidisciplinary Hen Egg Research

**2002 - 2006**
**Chair: Pr Rainer HUOPALAHTI (FI)**
**Signatories: AT, BE, CZ, DE, DK, ES, FI, FR, GR, IT, NL, PL, SE, UK**

Despite the lack of anticipated funds in the first year, all activities were completed within the lifespan of the Action. The Action was able to initiate a network called “The Center of Exellence for Hen Eggs”, which is ready to find a proper “call” in FP7 Work Programme 2007-8.

The Action arranged several very successful meetings alongside major European scientific events. For example, in Verona, at the XII European Poultry Conference on 10-14 September 2006, many speakers came from COST 923,and all the speakers in the first seminar on 10th of September were “COST people”. The seminar was arranged by WPSA working group 4 chaired by Yves Nys.

A major milestone is the the book entitled “Bioactive Egg Compounds Characterisation and Application”,. This will cover the whole field of our activities during the years 2002-2004. When it is published (late 2007), it will hopefully provide an excellent source for exploring the hen’s egg, its components and new products that can be made from these eggs. The most important results of Cost 923 Action,are:

1. the network itself including active web pages
2. the book: Bioactive Egg Compounds Characterisation and Application

# Forests, their Products and Services

## Action E27 - Protected Forest Areas in Europe - Analysis and Harmonisation (PROFOR)

**2002 - 2006**
**Chair: Dr Georg FRANK (AT)**
**Signatories: AT, BE, BG, CY, CH, CZ, DE, DK, ES, FI, FR, GR, IE, IT, LT, MK, NL, NO, PL, PT, RO, RS, SI, SE, UK**

COST Action E27 aimed to provide a better understanding of divergences in protected forest areas at the national and international level and to explain the reasons for this diversity. The main task of the Action was to analyse and harmonise the whole range of Protected Forest Area (PFA) categories in Europe in compliance with existing international categories for protected areas. Major emphasis was placed on cooperation between scientists and managers from both nature conservation and forest administration. Besides the 25 European signatory countries, the Ministerial Conference on the Protection of Forests in Europe (MCPFE) and the European Environment Agency (EEA) had an observer status. COST Action E27 also co-operated closely with The World Conservation Union (IUCN), Pan-European Biological and Landscape Diversity Strategy (PEBLDS) and UN-ECE.

Country reports served as basis for the analysis of the various types of protected forest areas across Europe. Information was provided in a consistent manner regarding content and structure to allow comparisons between countries. Those analyses have revealed that between member countries there still exists a great variation in typology, restrictions on use and motivation for designation of the different types of protected forest areas. Efforts were made to identify characteristics, similarities and differences between categories of protected forest areas and countries with respect to restrictions and motivation for designation.

Both classification systems as defined by IUCN and MCPFE were evaluated by country experts of COST Action E27 by means of statistical analysis and surveys based on questionnaires, country reports and plenary discussions. Results showed considerable variation, and even on strictly defined protection categories full harmonisation has not yet been achieved. Therefore, to date, no harmonised and comparable dataset on PFA is available in Europe.

Based on the results of the evaluation and on subsequent discussions within COST Action E27, a number of recommendations to improve the quality and comparability of the statistics have been compiled. COST Action E27 has produced an extensive document pointing out sources of uncertainty in the existent reporting systems, and formulating concrete suggestions or clarifications that should help reduce the divergence in interpretation, thus leading to more harmonised and comparable datasets. On the basis of the recommendations of COST Action E27, the Liaison Unit of MCPFE has supplemented its Assessment Guidelines by an Information Note to be used by country correspondents in collecting information for the fifth MCPFE Conference taking place in autumn 2007 in Warsaw.

Information on the COST Action E27 clearing house mechanism can be found on the Internet at http://www.efi.fi/projects/coste27/. Reports and other documents are available on http://bfw.ac.at/020/profor/ .

## Action E28 - GENOSILVA: European Forest Genomics Network

**2002 - 2006**
**Chair: Ms Silvia FLUCH (AT)**
**Signatories: AT, BE, BG, CH, DE, DK, ES, FR, FI, GR, HU, IE, IT, LT, NL, NO, PT, SE, SI, UK**

COST Action E28 aimed at capitalising on the substantial genome resource that has been developed for model tree species like poplar or pine and to use this knowledge to develop new tools and biotechnology to enhance forest productivity and durable forest health. Furthermore, the Action initiated an active dialogue with forestry practitioners, including tree breeders, forest managers and policy makers in order to discuss the needs and requirements for new tools to enhance forest productivity and forest health.

An important objective of the Action was to use knowledge generated by basic plant science as well as by experts working on model species for studying less well investigated species of the forest tree sector. The cDNA micro array technique was applied successfully in analysing the particular aspects of wood formation. Micro arrays constructed by using gene sequences (ESTs ; Expressed Sequence Tags) from closely related species such as white oaks (Quercus), chestnut (Castanea) and poplar (Populus) as well as ESTs from special cork oak cDNA libraries were used to study cork and phellem formation in cork oak (Quercus suber) and Quercus ilex. Those studies showed that homologous as well as heterologous targets were revealing informative results on genes involved in cork production in oaks. The same approach was used to analyse aspects of forest health, in particular to investigate differential expression of candidate genes in poplar exposed to drought. The results are demonstrating that heterologous gene collections on micro arrays, and thus knowledge from model species, are applicable for expression analysis across species borders.

In another effort, a new technology established for the human genome for the detection of methylated DNA sites could be transferred to plants for the investigation of developmental differences in tissues such as needles or buds as well as maturation differences in tissue generated during in vitro propagation of trees. The technique was successfully applied to chestnut and pine to detect tissue specific methylation patterns.

To contribute to the development of sustainable forest resources across Europe COST Action E28 fostered the use of new genetic tools in the field of forest breeding by supporting actively the technology transfer from leading European laboratories to less technologically advanced sites. Recently established techniques from state of the art research institutions were applied to elucidate particular scientific issues such as hybrid detection in Austrian and South Italian poplar or for discriminating Lithuanian Populus/Fraxinus hybrids. A methodology transfer in the area of diversity estimation and plant selection based on molecular markers contributed to successful analyses of less investigated species such as Sorbus in Hungary or Fraxinus in Lithuania. Thus the Action contributed to the anchoring of genetic and genomic tools in applied forest research.

The final conference was organized jointly with the Working Groups 2.04.01 (Population, ecological and conservation genetics) and 02.04.10 (Genomics) of the International Union of Forest Research Organisation (IUFRO). This way the outcomes of COST Action E28 gained broad attention and drew a vivid scientific debate. The results of this conferences titled 'Towards forest community and ecosystem genomics' were published in The New Phytologist 01/2007 (Lexer et al).

A highly informative web-site has been established (http://www.genosilva.org) which will remain active after the end of E28 at ARC, Seibersdorf, Austria, displaying a wide collection of scientific papers as well as discussion results on the web.

## Action E30 - Economic integration of urban consumers' demand and rural forestry production

**2002 - 2006**
**Chair: Dr Anssi NISKANEN (FI)**
**Signatories: AT, BG, CH, DK, FI, FR, DE, GR, HU, HR, IE, IS, IT, LT, NL, NO, PL, PT, RO, SE, UK**

The main objective of the Action was to gain a better understanding of the problems and possible solutions of the forest-based entrepreneurship in small-scale forestry, wood processing and non-wood forest products and services aiming at improved employment and income in rural areas.

One of the main achievements of the Action was the provision of harmonised state of the art information and data relevant for forest sector entrepreneurship in Europe. These results were published in Action workshop proceedings; including information and data on production, consumption and demand structures of wood, non-wood products and services, and characteristics of forest sector production conditions e.g. resources, ownership patterns and forestry practices. This information provides a first systematic basis to identify the state of the art of the conditions for enterprise development in the forest sector in Europe.

A further main scientific achievement of the Action was the analysis of (i) factors affecting the competitiveness of forest – wood / non-wood / services – consumer chain, (ii) the main barriers and prospects to entrepreneurship, and (iii) problems and opportunities for enterprise development in the forest sector at the European level. The results of these analyses illustrate, that forest ownership is considerably

fragmented and forest owners' attitudes and values very diversified; thus it is uncertain how private forests can maintain their role to support increasing timber demand in the future. It is also evident on the basis of the Action results that increasing demand on green products and services in the future may not result into sufficient amount of new entrepreneurship because traditional wood production culture dominates in forest sector institutions in Europe. The analyses and results on the three questions above were presented in 17 scientific papers in the final workshop held in January 2006 and published in the workshop proceedings. A set of these research papers will be elaborated further and published in a special issue of the Small-scale forestry journal in 2007.

COST E30 made substantial progress in collecting and elaborating the existing information on forest sector entrepreneurship. Through its achievements, the Action has brought the issue of entrepreneurship more strongly in the agenda of forest research in Europe. The results of the Action – summarised in the final report – are likely to bring forward new forest-based businesses and business related research in the future.

A highly informative web-site was established at http://www.joensuu.fi/coste30/. The website contains information on Action results and other relevant information and publications on forest sector entrepreneurship.

# Individuals, Societies, Cultures and Health

## Action A19 - Children's welfare



**2001 - 2006**
**Chair: Pr An-Magritt JENSEN (NO)**
**Signatories: AT, BE, BG, CY, CZ, DE, DK, EE, ES, FI, HR, IE, IL, IT, LT, MT, NO, RO, SE, UK**

The ageing of the European populations has gained momentum during the last part of the twentieth century. This development has caused much concern in European governments and public debates, but the focus on the role of children's welfare in these debates is limited. COST A19 Children's Welfare has highlighted the linkages between children's welfare and ageing societies. Is children's welfare threatened by the rising number of old people? Is children's welfare a necessity for young peoples' willingness to produce children? Are falling birth rates private solutions to public problems?

While Europe is facing a common ageing of societies, the rate of the development is stronger in some countries than in other. Lessons should be learned from this variation.

The Action, which included 20 member countries, has published a set of pan-European conclusions (Norwegian Centre for Child Research, 2004) and a second major, thematically structured report (University Press of Southern Denmark, 2007). The Action co-organised the high-profile international conference "Childhoods 2005" and organised a training school in connection with its final conference in June 2006.

The three most important issues were children's material welfare, their access to their own time and space, and children's rights, including how they can take part in public debate. Poverty is a topic of particular concern, with one child in five in Europe now living below the poverty line. The growth in single and separated parents restricts family incomes, while larger families also tend to be poorer. The study concluded that income from two parents is the main determinant of material well being, but even that is a precarious factor. The balance between the welfare of the child, parental income and the role of the state is crucial to Europe's future.

As well as reducing in numbers, children tend to be more segregated than they used to be, whether at home, in school or in the 'virtual' space of a computer or TV. Children are rarely just around, making them less visible to the world at large and poorly understood by childless adults. Their free time is also diminishing –even much of their 'leisure time' is given over to organised activities. In some countries, these obligatory tasks can take as long as an adult working week. On the other hand, children now also travel more widely, on holiday or to visit a separated parent, which broadens their perspective.

Children's rights, and their place in society have become a concern only in the past decade or so. These rights may conflict with adult interests, in local planning issues, in divorce and in cases of migration. The contribution that children make to society, through schoolwork, for example, has to be recognised. Despite the distancing between generations, children need to be acknowledged as contributing to the common good, rather being a family responsibility.

## Action A20 - The impact of the internet on the mass media in Europe

**2001 - 2006**
**Chair: Pr Colin SPARKS (UK)**
**Signatories: AT, BE, BG, CH, CY, DE, DK, EE, ES, FI, FR, GR, HR, HU, IE, IT, LT, NL, NO, PT, SE, SI, UK**

The main objectives of the Action were to track the ways in which the development of the internet impacted upon the mass media. This general objective was broken down according to the nature of the media involved, since they have different relationship with the internet. For example, music requires very much less bandwidth than television. Accordingly, the work of the Action was conducted following five lines of enquiry:

1. Music. Already at the start of the Action, peer-to-peer file sharing (e.g. the then version of Napster) was having a major impact on the ways in which music was acquired, and thus upon the business models of music companies. Work on this topic centred around changing methods of distribution and the resulting issues of copyright.

2. Printed media. Already at the start of the Action many newspapers already had websites, although none in Europe had managed to develop successful business models to support them. Work on this topic focussed on trying to classify different kinds of online media, and on understanding the relationship between offline and online news.

3. Film and television. The bandwidth demands of these media meant that their potential development on the internet remained in the future for the duration of this Action. However, many of the predicted characteristics, notably interactivity and video-on-demand, were to be found in digital systems, and work on this topic focussed on trying to understand the ways in which such innovations were used by audiences.

4. Radio. This medium is relatively little studied today and work on the specific issues involved in its relationship to the internet had to begin from a very basic level. Work on this medium focussed on the ways in which the internet permits different kinds of relations between broadcasters and the audience.

5. Cross-media issues. Some important aspects of the impact of the internet, for example copyright problems, are not exclusive to one medium and these topics were studied across a range of different media, although as in the case of music it was the case that issues were first posed most sharply in particular one particular medium.

The Action attracted a large number of participants. 23 countries were represented on the Management committee. The Action held three substantial conferences (the last one with more than 100 participants) and numerous working meetings. The Action produced six edited volumes of findings and a large number of scholarly papers.

## Action A21 - Restorative Justice

**2002 - 2006**
**Chair: Pr Ivo AERTSEN (BE)**
**Signatories: AT, BE, BG, CH, CY, DE, ES, FI, FR, HU, IE, IL, IT, LU, NL, NO, PL, PT, RO, SI, UK**

According to the Memorandum of Understanding, the main objective of the Action was to enhance and to deepen knowledge on theoretical and practical aspects of restorative justice in Europe, with a view to supporting implementation strategies in a scientifically sound way. More precisely, the Action focused on analysing:

- the process and the effects of victim-offender mediation and conferencing;
- national data recording systems;
- organisational features, job evaluation and satisfaction;
- national legislation in relation to victim-offender mediation;
- the relation between criminal justice and restorative justice practices and agencies;
- training models and the experience of training legal professionals in the restorative justice area;
- new restorative justice models and applications;
- theoretical concepts, approaches and frameworks on restorative justice;
- the applicability of restorative justice principles on (international) violent conflicts and mass victimization.

The Action organised a number of working group meetings, Short Term Scientific Missions, as well as five international conferences.

A book has been published:

- Aertsen, I., Daems, T. and Robert, L. (eds.), Institutionalizing Restorative Justice, Cullompton, Willan Publishing, 2006.

Three other books are being prepared and are expected to be published in 2007:

- 'A Comparative Study of Restorative Justice Provision in Europe', Polizei und Wissenschaft, Frankfurt.
- 'Images of Restorative Justice Theory', Polizei und Wissenschaft, Frankfurt.
- 'Restoring justice after large-scale violent conflicts: Kosovo, Israel-Palestine, Congo and Northern Ireland', Willan Publishing, Cullompton, UK.

Moreover, a special issue of Contemporary Justice Review is planned in 2007, entitled 'Contemporary Restorative Justice practices in Europe - Evaluative research presentations'.

# Information and Communication Technologies

## Action 270 - Reliability of optical components and devices in communications networks and systems

**2000 - 2006**
**Chair: Pr Hans LIMBERGER (CH)**
**Signatories: AT, BE, CH, CY, DE, DK, ES, FR, HU, IT, LV, NL, PL, SE, UK**

The main objective of the Action was to develop methods to ascertain and improve the reliability of the new types of optical components and devices in communications networks and transmissions systems including aspects regarding network and component costs, environmental conditions and installation procedures for equipment in core transport networks, in subscriber access networks, and in in-house (local area) networks

Therefore, most of the effort at first was to improve the understanding of the failure mechanisms of new types of optical components and devices in new high capacity/bandwidth/speed systems and networks. Simultaneously, information on their field behaviour was gathered to study the effect of the service environment on the components, devices, networks and systems. Following this, efforts were concentrated on improving life test methods. Finally, lifetime estimation methods were analysed and developed.

A further objective was to co-ordinate the research that is performed in component and in system manufactures and in research institutes and in universities, in order to foster the appropriate transfer of results and experience to the standardization bodies, such as ETSI, CECC, IEC, and ITU, in the form of input and help for standardization.

The main results and achievements of COST 270 were as follows.

• Constitution of a European network of industrial and academic partners focussed on issues of reliability of the key components of optical systems and networks

• Scientific and technical contributions establishing the state-of-the-art in the identification of new mechanisms of degradation of the components (optical power, technique of manufacture), of method of measurement and characterization qualifying the reliability of the connectors, and on modelling of the survivability of the optical networks. Notably, the Action triggered the first contributions to the study of the incidence of the atmospheric conditions on the transmission optics in free propagation.

• Establishment of many connections allowing the dissemination of the results within organizations of standardization, such as CENELEC, ETSI, IEC, ITU-T.

• An excellent dissemination of the results through a large number of publications and the organization of several workshops and conferences.

The activities of research undertaken in this Action contributed to develop a better knowledge of the phenomena of degradation of the optical components and their incidence on the reliability of the optical networks. The close connections maintained with Industry involved in the activities taking part in the various workshops made possible to take into account the results and the recommendations suggested in the methods of realization or measurements of the components.

## Action 281 - Potential Health Implications from Mobile Communication Systems

**2001 - 2006**
**Chair: Pr Norbert LEITGEB (AT)**
**Signatories: AT, BE, BG, CH, CZ, DE, DK, EE, ES, FI, FR, GR, HR, HU, IE, IT, LT, LV, NL, NO, PL, PT, SE, SI, UK**

The main objective of the Action was an understanding of possible health impacts of emerging technologies, especially related to communication and information technologies, which may result in exposure to electromagnetic fields (EMF). Additionally, the Action was created to provide a scientific evaluation of (1) available data for use by various decision makers involved in risk management of EMF, (2) a basis for risk communication efforts related to emerging technologies, (3) EMF and possible health risks, and (4) data on EMF exposures related to emerging technologies on a European level.

The main issues tackled by the Action were information and communication technologies, medical applications, EAS/RFID, transport, and other technologies that produce similar EMF. The need for detailed interpretation of scientific data resulted in establishing six working groups

dealing with genetic and cytogenetic aspects; mobile communication and children; base station monitoring/ dosimetry; statistics; new emerging technologies; and a task force on epidemiology.

Examples of important contributions from the Action are as follows.

• Thorough review of available papers and scientific data related to the potential health implications from mobile communication systems.

• Identification of gaps in the knowledge and main difficulties in the interpretation of the collected research knowledge.

• Compilation of guidelines for high quality research and recommendations for further studies.

• Identification of new potentially hazardous technologies and applications and of potentially vulnerable groups.

Additionally, thematic reports were prepared, summarising scientific comments on the following issues:

• Epidemiological studies on the health impact of mobile communication base stations.

• Individual statements of concern about health hazards of weak EMF.

• Recommendations on international research on genotoxic effects of EMF from mobile communication systems.

Dissemination of the results of the Action was also carried out by publication of Watchdog Reports (in 2002 and 2003), the COST 281 Newsletter, and a joint letter from ICNIRP, EBEA, and COST 281 to European Parliament on EMF and human health.

Another tool of dissemination of the results of the Action was the COST 281 web page. During the last three years it received between 1000 and 2000 visits each month, showing the high international interest for the results co-ordinated by the Action.

*166th Committee of Senior Officials meeting*
*20-21 November 2006*

## Action 284 - Innovative Antennas for Emerging Terrestrial and Space-based Applications

**2002 - 2006**
**Chair: Pr Juan MOSIG (CH)**
**Signatories: BE, BG, CH, CS, DE, DK, EE, ES, FI, FR, GR, HR, HU, IT, NL, NO, PT, SE, TR, UK**

The main objectives of the Action were to progress and innovate in the theoretical modelling and in the multidisciplinary design and development of new architectures, components, circuits, and test techniques for antennas. The foci were on antenna arrays, on active and adaptive antennas, and on their beam forming, in support of broadband applications up to millimetre waves.

Further objectives included:

• To foster University-Industry research cooperation in the field of antenna modelling and innovation and to increase the number of cooperative research projects, in particular involving trainees and doctorate candidates placed in industrial laboratories.

• To consolidate and expand a network of European specialists from academia and industry on antennas, in coordination with relevant COST Actions and other European research activities, e.g. within the IST programme and ESA.

COST 284 has demonstrated its capability to achieve an efficient connection between researchers of academia, together with industry and companies. Among the major outcomes of the Action were the launching of a network of excellence (ACE) which has strong links with COST 284, and the creation of a major European Conference in the area of antennas (EUCAP).

Furthermore, the following topics stemming from the Action can be regarded as special achievements:

• Transmitting and receiving optical beam forming networks

• Controlled radar cross section

• Novel multibeam antennas for space applications

• Novel fed horn developments

• Phase synthesis method for conformal array antennas

• EBG multibeam antenna suing metallised foam

• Tri-corner reflector antenna

• Integrated lens antenna shaping for submillimetre waves

The networking between the Action members brought solid results like benchmarking of conformal antenna design tools and free exchange of non commercial simulation software, or benchmarking of antenna measurement techniques. The very positive feeling of the work carried out had undoubtedly a fruitful effect in terms of structuring and impetus given to antenna research in Europe, as witnessed by the more than one thousand participants to EUCAP's first edition in 2006.

# Materials, Physical and Nanosciences

## Action 529 - Efficient Lighting for the 21st Century

**2002 - 2006**
**Chair: Pr Georges ZISSIS (FR)**
**Signatories: AT, BE, BG, CH, CZ, DE, ES, FI, FR, GR, HR, HU, IT, LT, LV, NL, PT, RO, SE, UK**

The main objective of the Action, at both the basic breakthrough and the pre-competitive research levels, was to seek for new concepts and materials for the lighting industry through the study of the feasibility of high efficacy, novel, light source technologies.

COST 529 brought together scientists from academia and from the three major European companies in lighting. One of the most significant outcomes was the "COST Reference Lamp".More than 100 specimens of this Metal Halide Lamp (with different metal halide contents) have been produced by Philips, and they were distributed to various labs for testing and metrological purposes. Another highlight was the design of a new urban lighting scheme in the French city of Albi, well publicized in various news media.

## Action 530 - Life Cycle Inventories for Environmentally Conscious Manufacturing Processes

**2001 - 2006**
**Chair: Dr Michael BETZ (DE)**
**Signatories: AT, BE, BG, CH, CY, DE, DK, ES, FI, GR, HR, LT, NL, NO, PL, SE, SI, UK**

The Action aimed to increase the knowledge of environmental impacts of manufacturing processes in order to develop and implement environmentally conscious processes, reduce environmental impacts, and take knowledge based decisions. This was reached by fostered application of the Life Cycle Assessment (LCA) methodology within the manufacturing industries.

The Action tested the application of LCA for sustainability oriented decision making based on improvement of its operational applicability through increased knowledge and advanced methods. It included decision making problems integrating the broader sustainability, especially economic and performance considerations (Eco Efficiency, Life Cycle Engineering) and operational applicability problems with their integration into existing industrial decision-making processes (Design for Environment)

## Action P7 - X-ray and Neutron Optics

**2002 - 2006**
**Chair: Dr Thomas KRIST (DE)**
**Signatories: BE, CZ, DE, ES, FR, HU, IT, NL, PT, SE, SK, UK**

The Action worked in the field of X-Ray and neutron interactions with solid surfaces and interfaces in order to develop fabrication and characterization methods for advanced innovative optical elements for applications in this extreme short wavelength range. The Action investigated new types of optical elements adapted to this energy range, and their efficiency and versatility. The target was not only the extention of the field of applications of very short wavelength optical elements on current x-ray and neutron sources but also the test of new fields opend now due to better characteristics of the more recent available and planned new sources.

## Action P8 - Materials and Systems for Optical Data Storage and Processing

**2002 - 2006**
**Chair: Pr Hans Joachim EICHLER (DE)**
**Signatories: BE, BG, CH, DE, DK, ES, FR, GR, HU, IE, IT, LT, LV, PL, RO, UK**

The Action focused on both advanced technologies and materials which have the potential to satisfy the ever-increasing demands of computer systems in terms of high capacity and high data transfer rates.

Action investigated materials for holographic and microholographic data storage including photopolymers, liquid crystal based materials and inorganic photorefractive materials. Comparative studies have been made with the international state of the art and the requirements of the different holographic storage systems under investigation have been estimated to determine the direction of further material research. The Action involved industrial partners investigating holographic and microholographic storage systems targeting storage capacities up to 1 Terabyte.

Action started interestiong project on development of a microfiber holographic disk storage system in France.

With this prelimenary results COST Action has been highly successful helping European industry to compete with strong activities in Japan and the USA trying to bring holography to the storage market.

## Action G7 - Artworks Conservation by Laser

**2000 - 2006**
**Chair:Dr. Renzo SALIMBENI (IT)**
**Signatories: AT, BE, CY, DE, DK, ES, FI, FR, GR, HU, IL, IT, LT, MT, NL, NO, PL, PT, RO, SI, UK**

After more than thirty years since the first promising tests of laser techniques in conservation, by the end of the '90s this method did not yet provide results convincing the cautious community of conservators and restorers, because of a series of unsatisfactory side effects. Therefore the main objective of Action G7 was to foster interest for research in this topic, in order to overtake problems and exploit the potential of laser techniques as diagnostic and restoration tools. The activity was directed to promote an interdisciplinary approach involving conservators, archaeologists, curators besides laser physicists, chemists, biologists and geologists, to exchange experiences between partners, to validate best practices, to recommend safety guidelines and disseminate them throughout Europe.

Along the Action G7 lifetime these tasks have been pursued by three Working Groups focussing on Laser systems for cleaning applications (WG1), Laser and optical systems for analysis and diagnostics (WG2) and Real-time equipment for environmental aspects and the response of artworks (WG3).

Thus, the following important scientific achievements have been accomplished by COST Action G7:

- more suitable laser ablation operative regimes useful for cleaning of artworks were clearly defined, extending the experimentation from the initial nanosecond pulses to microsecond pulses, which could avoid the side effects hindering the use of lasers;

- best practices of laser cleaning of stone, metals, paintings, paper etc. could extensively demonstrate a precision in the micrometer range never achieved before with traditional methods; consequently they were disseminated to the conservators communities encountered in each meeting location, with a convincing set of successful examples of case studies;

- best practices about laser diagnostics and monitoring techniques were identified for investigation of the materials composition, for the detection of defects as well as for 3D documentation.

Several projects were devised at European level in various programs: FP6, EUREKA, INTERREG, CULTURE 2000 etc. Furthermore, COST Action G7 has been able to promote numerous activities at national level inducing in many countries the generation of interdisciplinary networks. New laser techniques developed in such specific projects could find in Action G7 the appropriate level of debate, allowing comparison and constructive critics, and of dissemination at European level, leading to a general advancement of knowledge in the use of lasers in conservation.

After about five years of activity Action G7 has been concluded with the main outcome that today lasers in conservation of artworks are employed on an everyday basis by many institutions and private restorers in Europe. Lasers for cleaning are routinely employed for important stone decorations and statues, and are considered the best practice for marble masterpieces when ancient patinas have to be preserved. Laser cleaning of metals has found also a niche of best practice when gold films or silver films have to be preserved. For other categories such as paintings and ancient documents the appreciation of the laser potential is also growing.

The web site http://www.infim.ro/cost hosts a detailed information about COST Action G7, the activity and two main deliverables: the publication "Cleaning safely with a Laser in Artwork Conservation", and the CD "Handbook on the use of lasers in conservation and conservation science", available at http://www.science4heritage.org/COSTG7/booklet.

## Action G8 - Non-destructive analysis and testing of museum objects

**2001 - 2006**
**Chair: Dr Annemie ADRIAENS (BE)**
**Signatories: AT, BE, BG, CH, CY, CZ, DE, DK, ES, FI, FR, GR, HU, IL, IT, MK, MT, NL, PL, PT, RO, SI, SK, UK**

The main objective of the Action has been to achieve a better preservation and conservation of cultural heritage by increasing the knowledge of museum objects through non-destructive analysis and testing and by improving the synergy between art historians, archaeologists, conservators and natural scientists. The Action strengthened the multidisciplinary community in this field.

It enhanced the capability for answering questions related to museum objects and the exchange of knowledge.

Action G8 provided museums and similar institutes easy access to universities and research facilities that have the required analytical techniques and related expertise available.

Moreover COST Action G8 led to several new developments like instrumentation and methods for parallel in-situ electrochemical and X-ray studies of corrosion and cleaning/passivation of metals, ultra low energy SIMS for the study of the early stages of corrosion on glass and metal surfaces, differential PIXE measurements of thin metal and many other.

# Transport and Urban Development

## Action 348 - Reinforcement of pavements with steel meshes and geosynthetics

**2001 - 2006**
**Chair: Mr Hans RATHMAYER (FI)**
**Signatories: AT, BE, CH, ES, HR, DK, FI, FR, DE, GR, HU, IE, IT, NL, NO, PL, PT, RO, SI, SE, UK**

The Action was established to forward and enhance the processes of material assessment and design for road construction and maintenance using reinforcement in the bound or un-bound layers. The Action has been investigating the use of reinforcement to improve the in-service performance of roads and highways, for both maintenance and new-build. All kinds of reinforcement types have been considered, along with the most effective methods for assessing pavement performance.

Design models for the structural design of pavements with geosynthetics and steel meshes have been analysed in detail. It became obvious that empirical pavement design methods which are often used, usually consist of tables with standardized input data. These models are calibrated for the specific country/project conditions and have a ling history of performing well under normal conditions and with conventional materials. It is therefore concluded that the introduction of new products into the road construction industry requires semi-analytical or advanced analytical approaches to assess the general condition of pavements with reinforced layers. There is no generally accepted design model available for routine use and the reliability of existing approaches is still under investigation. The review of current practice, test methods and design methods has demonstrated gaps in knowledge which to some extent limit the breakthrough in applying this technology.

Nevertheless, the benefits of using geosythetics and steel meshes in new construction and maintenance of road pavements proved to be promising. This alternative of using reinforcement in construction and maintenance of pavement structures provides significant benefits for road administrations and policy makers, for the environment, the industry and road users. The work done in this COST Action confirmed in all aspects the benefits of pavement reinforcement.

The Action has successfully generated international co-operation between road authorities, research institutes and industry. Over 20 European countries participated in COST Action 348.

## Action 350 - Integrated assessment of environmental impact of traffic and transport infrastructure

**2001 - 2006**
**Chair: Mr Hans BEKKER (NL)**
**Signatories: AT, BE, CH, CY, CZ, DE, ES, FR, GR, HU, IE, IT, LV, LT, NL, PL, PO, RO, SI, UK**

The main objective of the Action was to establish a concept integrating at regional scale all the environmental aspects of traffic and land-transport infrastructure in relation to the decision-making process – in order to assist policy-makers at an earlier stage of their decision-making process.

The final report developed an operational methodology and key aspects in support of Strategic Environmental Assessment (SEA). The main elements are:

- Transport infrastructure planning situations and planning options.
- Impact and indicator structure.
- Impact assessment and impact aggregation methods.
- Transport planning option parameters and assessment methods including monitoring.

The results and recommendations were related to four geographical levels (national, regional, local and corridor level). Based on these levels, an evaluation was made on Sea compliance of case studies with the EU-directive and a synthesis of present approaches and lessons learned.

Furthermore, the Action explores the themes of impact scoring (significance) and aggregation in the context of integrated assessment. A review of relevant guidance documents and methods was carried out and examples of best practice were explored. The Action brought together existing available guidance on “impact significance” across the member states participating in this COST initiative.

## Action C15 - Reinforcement of pavements with steel meshes and geosynthetics

**2002 - 2006**
**Chair: Mr Hakan SCHROEDER (SE)**
**Signatories: CH, DE, DK, FI, FR, HU, IT, NL, NO, PO, SE, UK**

The main objective of the Action was to improve methods and technology related to the coexistence of technical infrastructures and vegetation in European cities, and to prevent potential problems arising from their interaction. Doing so, the Action used an interdisciplinary approach between research and development units working within technology, economics and biology.

The area of research encompassed a planning perspective with the aims of analysing and evaluating the economic and environmental consequences of various methods and technology and preventing the occurrence of problems at the planning and construction stage.

Action members published the results of C15 in different conferences.

## Action C17 - Built Heritage: Fire Loss to Historic Buildings

**2002 - 2006**
**Chair: Mr Ingval MAXWELL (UK)**
**Signatories: AT, BE, BG, CH, DK, ES, FI, FR, HU, IL, IT, MK, NL, NO, PL, SE, SI, TR, UK**

The main objective of the Action was the definition, at a European level, of the degree of loss to "Built Heritage" through the effects of fire and the proposal of remedial actions and recommendations to combat such loss, using minimal invasive techniques.

A first area of interest was mainly objective-oriented and aims at several practical issues, such as optimizing fire detection methods and developing fire-fighting strategies. The final objective is to protect human health and life, to conserve cultural heritage and to prevent material loss in general.

The second area of interest was method-oriented and aimed to develop or to improve the different scientific (engineering and physics) tools, which are required for the realization and execution of the above-mentioned tasks.

A huge communication activity was undertaken by COST C17 members in different international conference in order to disseminate the Action's results.

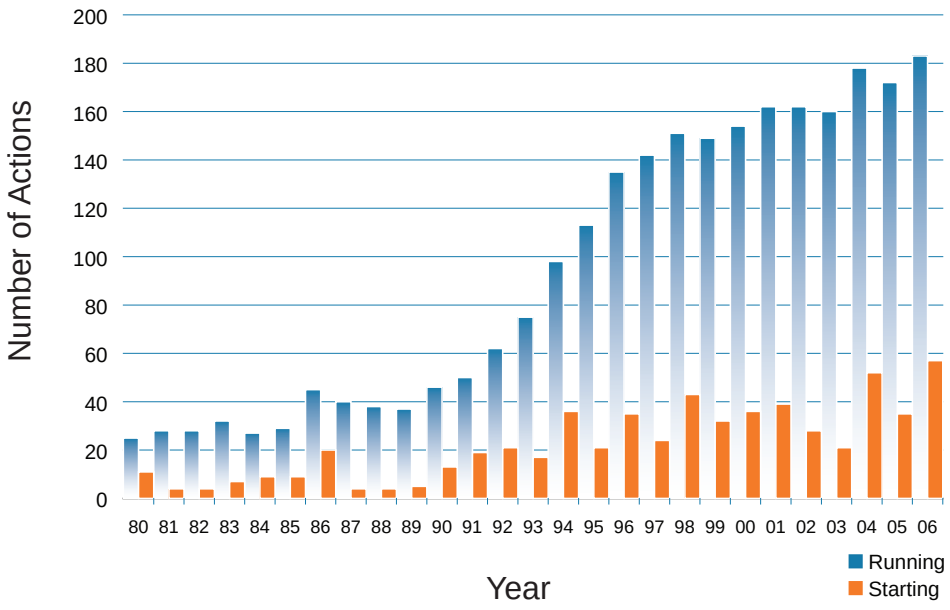


*European Forum on Nanosciences*
*Brussels, 19-20 October 2006*

# Statistics

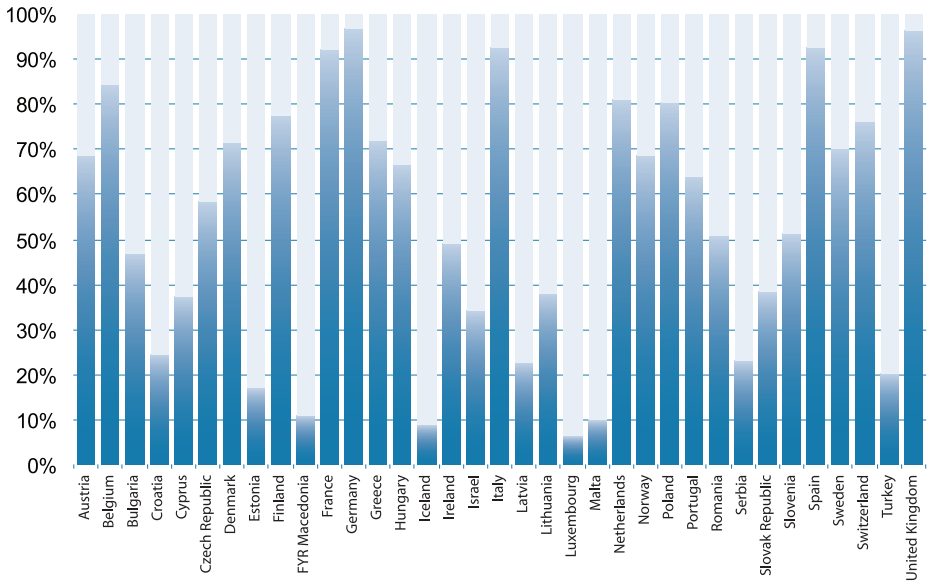
## Yearly evolution of the Running and Started COST Actions up to 2006

*(Status on 31st December)*

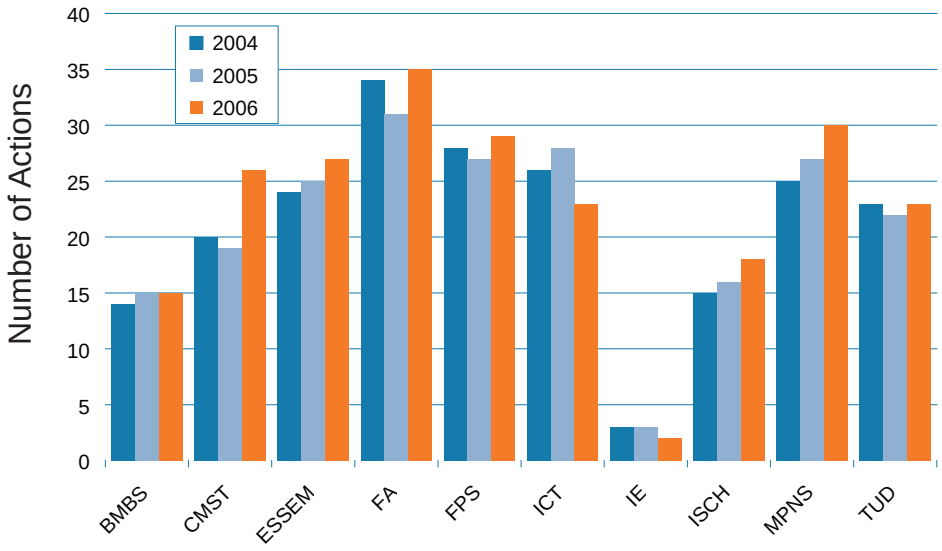



## COST country rate of participation 2006

*% of the total number of running Actions (228)*



# Number of COST Actions by Domain 2004 - 2006



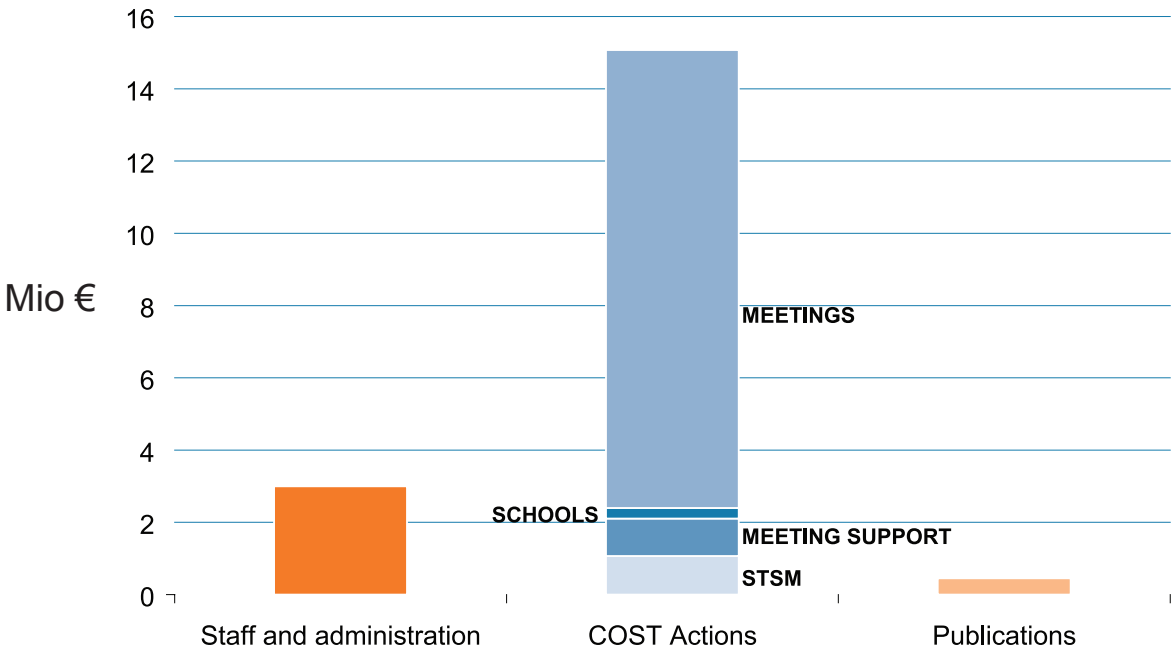

*Number of Actions Running any time of the year*

| YEAR | 2004 | 2005 | 2006 |
|---|---|---|---|
| *Biomedicine and Molecular Bio-sciences (BMBS)* | 14 | 15 | 15 |
| *Chemistry and Molecular Sciences & Technologies (CMST)* | 20 | 19 | 26 |
| *Earth System Science and Environ-mental Management (ESSEM)* | 24 | 25 | 27 |
| *Food and Agriculture (FA)* | 34 | 31 | 31 |
| *Forests, their Products and Services (FPS)* | 28 | 27 | 29 |
| *Information and Communication Technologies (ICT)* | 26 | 28 | 23 |
| *Interdisciplinary Exploratoria (IE)* | 3 | 3 | 2 |
| *Individuals, Societies, Cultures and Health (ISCH)* | 15 | 16 | 18 |
| *Materials, Physical and Nanosciences (MPNS)* | 25 | 27 | 30 |
| *Transport and Urban Development (TUD)* | 23 | 22 | 23 |
| **TOTAL** | **212** | **213** | **228** |

*Number of Actions in % year* (full year = 1)

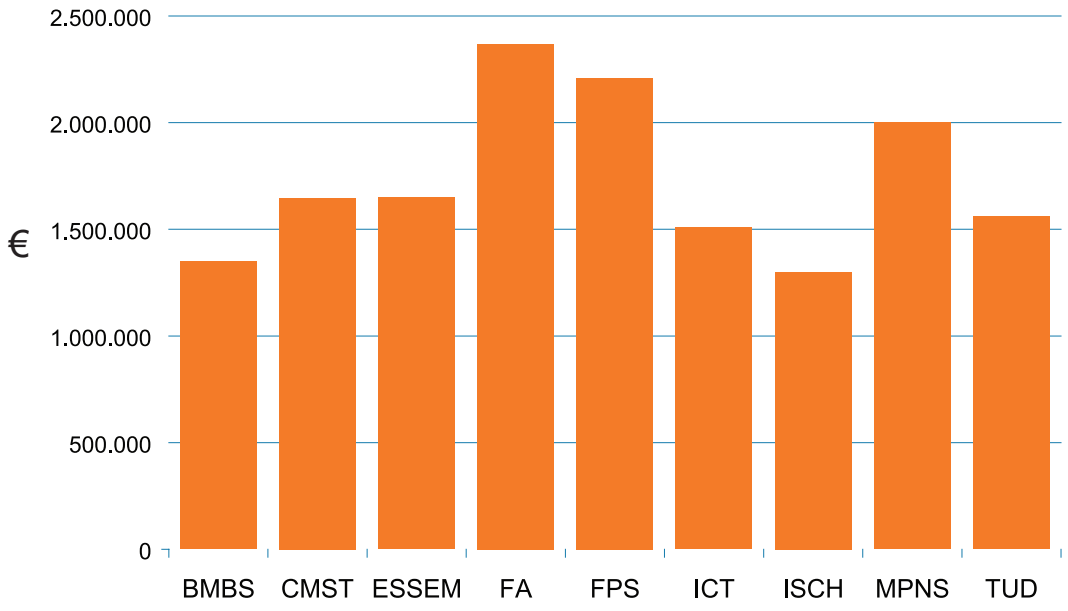
| YEAR | 2004 | 2005 | 2006 |
|---|---|---|---|
| *Biomedicine and Molecular Bio-sciences (BMBS)* | 12,4 | 11,6 | 12,3 |
| *Chemistry and Molecular Sciences & Technologies (CMST)* | 19,1 | 17,1 | 16,5 |
| *Earth System Science and Environ-mental Management (ESSEM)* | 18,6 | 21,9 | 18,6 |
| *Food and Agriculture (FA)* | 30,4 | 26,6 | 24,0 |
| *Forests, their Products and Services (FPS)* | 21,8 | 24,4 | 24,0 |
| *Information and Communication Technologies (ICT)* | 21,9 | 22,2 | 18,2 |
| *Interdisciplinary Exploratoria (IE)* | 3,0 | 3,0 | 0,3 |
| *Individuals, Societies, Cultures and Health (ISCH)* | 11,3 | 13,7 | 15,5 |
| *Materials, Physical and Nanosciences (MPNS)* | 20,1 | 23,9 | 25,2 |
| *Transport and Urban Development (TUD)* | 19,2 | 16,0 | 16,6 |
| **TOTAL** | **177,8** | **180,4** | **171,2** |

## COST Expenditure Distribution by spending line






## COST Expenditure Distribution by Domain



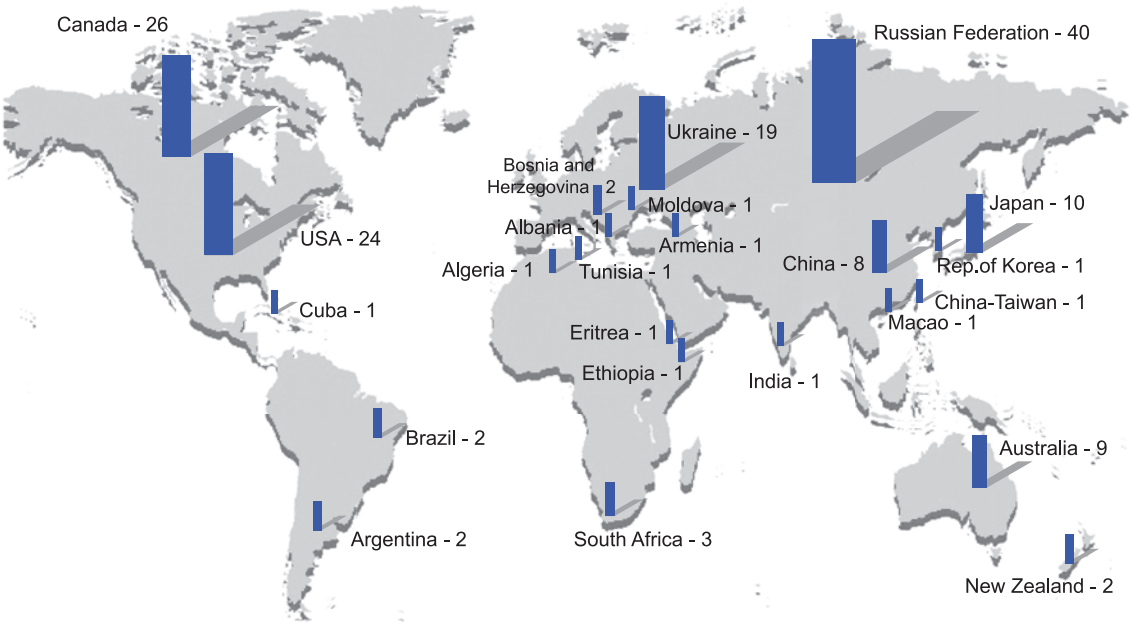
# Participation of Non-COST Country institutions

| COUNTRY | ACTION | INSTITUTION NAME |
|---|---|---|
| Albania *(1)* | 625 | Seismological Institute |
| Algeria *(1)* | 859 | Université Badji Mokhtar de Annaba - Faculté des Sciences de l'Ingénieur |
| Argentina *(2)* | 845 | Instituto Nacional do Tecnología Agropecuarias - INTA |
| | P10 | Universidad de Buenos Aires - Laboratorio Sistemas Complejos |
| Armenia *(1)* | 724 | Cosmic Ray Division - Yerevan Physics Institute |
| Australia *(9)* | 219 ter | GSA Information Consultant - Ascot |
| | 299 | University of Sydney, School of Physics |
| | 537 | Graduate School of Biomedical Engineering, University of New South Wales |
| | 852 | Pastoral and Veterinary Institute |
| | 859 | The University of Melbourne, School of Botany |
| | B22 | University of Technology of Sydney |
| | D27 | Queensland University of Technology at Brisbane |
| | P10 | Australian National University |
| | | Royal Adelaide Hospital, Cardiac Electrophysiology, Cardiovascular Investigation Unit, Adelaide |
| Bosnia and Herzegovina *(2)* | 625 | University of Sarajevo |
| | A30 | Media Center, Sarajevo |
| Brazil *(2)* | 530 | Materials Brazilian Institute of Information on Science and Technology (IBICT), Ministry of Science and Technology |
| | 539 | Chemistry Institute of the University of Sao Paulo State |
| Canada *(26)* | 270 | TR Labs, University of Alberta |
| | 287 | McGill University |
| | 295 | Université du Québec |
| | 355 | Ecole Polytechnique Montréal - Département de mathématiques et de génie industriel |
| | 531 | Materials and Manufacturing Ontario |
| | 722 | Canadian Meteorological Service |
| | B16 | Sainte-Anne-de-Bellevue QC |
| | | University of Toronto |
| | B19 | Children's and Women's Health Center of British Columbia |
| | | Ontario Cancer Institute - Princess Margaret Hospital |
| | | University of British Columbia |
| | B20 | University of Western Ontario |
| | B21 | National Research Council of Canada - NRCC |
| | | Neurological Institute Montreal |
| | B22 | CHUL - Centre de Recherche en Infectiologie |
| | B23 | Faculty of Dentistry, McGill University, Montreal |
| | | Université de Montréal |
| | | University Halifax |
| | | University of Toronto |
| | B25 | Health Canada |
| | B27 | University of Quebec |
| | P9 | Atomic Energy of Canada Limited (AECL) |
| | | Université de Sherbrooke |

| COUNTRY | ACTION | INSTITUTION NAME |
|---|---|---|
| Canada *(26)* | P18 | McMaster University - Department of Engineering Physics |
| | | Ryerson University Toronto - Electrical and Computer Engineering Department |
| | | University of Toronto - Department of Electrical and Computer Engineering |
| China *(8)* | 296 | LEME |
| | | Polar Research Institute |
| | 534 | Jiatong University - School of Civil Engineering and Architecture |
| | | The first Highway Survey and Design Institute of China |
| | 537 | Qindu Hospital |
| | | Stomatological College |
| | D30 | Institute of Biochemistry and Cell Biology - Chinese Academy of Sciences |
| | | Institute of Biophysics - Chinese Academy of Sciences |
| China - Taiwan *(1)* | 531 | National Cheng Kung University |
| Cuba *(1)* | B27 | Institute of Neurology and Neurosurgery |
| Eritrea *(1)* | 845 | University of Asmara |
| Ethiopia *(1)* | D29 | Chemistry Department, Addis Ababa University |
| India *(1)* | 859 | University of Hyderabad |
| Japan *(10)* | 219 ter | Tokyo University |
| | 539 | Faculty of Science and Technology, Keio University |
| | 727 | Kaganawa Institute of Technology |
| | 859 | Hiroshima University - Graduate School of Science |
| | B27 | The Institute of Physical and Chemical Research, RIKEN |
| | D30 | Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Yokosuka |
| | D32 | Kyushu University - Institute of Materials Chemistry and Engineering & the interdisciplinary Graduate School of Engineering Sciences |
| | E38 | Nutriant Dynamics Laboratory, Department of Forest Site Environment |
| | P14 | Osaka University |
| | P18 | Doshisha University - Department of Electrical Engineering |
| Macao *(1)* | 720 | Meteorological and Geophysical Service of Macao |
| New Zealand *(2)* | B27 | University of Auckland |
| | P11 | Victoria University of Wellington |
| Republic of Korea *(1)* | P16 | Department of Physics, Sungkyunkwan University, Suwon |
| Republic of Moldova *(1)* | A30 | Public Association “Our home - Chisinau” |
| Russian Federation *(40)* | 290 | Telecommunication Institute (ZNIIS), Moscow |
| | 296 | IZMIRAN - Russian Academy of Sciences |
| | 296 | University of St Petersburg |
| | 298 | Institute for Socio-Economic Studies of Population |
| | 537 | St.-Petersburg State Institute of Technology |
| | 539 | Institute of Solid State Chemistry |
| | 724 | Moscow State University |
| | | Space Research Institute, Russian Academy of Sciences |
| | 726 | World Radiation Data Center (WRDC), St. Petersburg |
| | 728 | Voeikov Main Geophysical Observatory (VMGO), St. Petersburg |
| | 850 | Russian Academy of Sciences |
| | 859 | Institute of Physicochem and Biological Problems in Soil Science |
| | B27 | Institute of Molecular Biology and Biophysics |
| | | Institute of the Human Brain of the Russian Academy of Sciences |
| | | State Research Institute of Physiology |
| | D18 | Joint Institute for Nuclear Research at Dubna |

| COUNTRY | ACTION | INSTITUTION NAME |
|---|---|---|
| Russian Federation *(40)* | D21 | Russian Academy of Sciences |
| | D27 | Semenov Institute of Chemical Physics |
| | D29 | Moscow State University |
| | D30 | Moscow State University |
| | D35 | Moscow State University, Department of Chemistry |
| | E39 | Moscow State University, Department of Bio-geography |
| | G7 | Research Centre "S.I.Vavilov State Optical Institute" |
| | P7 | Institute of Microelectronics Technology and High Purity Materials (IMT RAS), Russian Academy of Sciences, Chernogolovka |
| | | Rostov State University |
| | P10 | Institute of Philosophy |
| | P11 | Moscow State University |
| | P14 | Institute for Laser Physics |
| | | Institute of Mathematical Modelling |
| | | Institute of Physics of Daghestan |
| | | Joint Institute for Nuclear Research |
| | | Laser Research Institute, St Petersburg State University |
| | | Lebedev Physical Institute |
| | | Multicharged Ions Spectra Data Centre of VNIIFTRI |
| | | Prokhorov General Physics Institute, Russian Academy of Sciences |
| | P15 | Institute of Organic Chemistry, Siberian Branch of the Russian Academy of Sciences |
| | | Kazan Physical Technical Institute of the Russian Academy of Sciences, Kazan |
| | P16 | Russian Research Centre "Kurchatov Institute", Moscow |
| | P17 | D.V.Efremov Scientific Research Institute of Electrophysical Apparatus |
| | | Institute of Continuum Media Mechanics |
| South Africa *(3)* | B22 | University of Cape Town |
| | D20 | Rhodes University at Grahamstown |
| | D25 | Biosciences Unit of CSIR |
| Tunisia *(1)* | B27 | Faculté des Sciences de Tunis |
| Ukraine *(19)* | 530 | Materials Institute for Sorption and Problems of Endoecology, National Academy of Sciences of Ukraine |
| | 531 | Ivan Franko National University, Faculty of Physics, Lviv |
| | 532 | Institute for Problems of Materials Science |
| | 539 | Department of Functional Oxide Materials of the Institute for Problems of Materials Science |
| | 635 | National Academy of Sciences of Ukraine |
| | | Odessa National University |
| | 719 | Scientific and Industrial Enterprise "Ecomedservice" |
| | 720 | Innovation Center "Magic Solutions" |
| | 724 | Lviv Centre of Institute of Space Research |
| | 859 | Institute of Agroecology and Biotechnology of the Ukrainian Academy of Science, Kiev |
| | | National Agricultural University - Ukrainian Institute of Agricultural Radiology |
| | A30 | Kyiv-Mohyla Academy |
| | B35 | National Medical University of Lviv, Department of Hospital Therapy |
| | D20 | Kyiv National Taras Shevchenko University |
| | D21 | National Academy of Sciences of Ukraine |
| | D29 | National Academy of Sciences of Ukraine |
| | P14 | Frantsevich Institute for Problems of Materials Science of NASU |
| | P18 | Kyiv Polytechnic Institute - Department of High Voltage Engineering and Electrophysics |
| | | Usikov Institute for Radio-Physics and Electronics - Department of Remote Sensing |

| COUNTRY | ACTION | INSTITUTION NAME |
|---|---|---|
| United States *(24)* | 219 ter | Inclusive Technologies |
| | | Trace R&D Center - Madison |
| | 296 | University of Massachusetts, Lowell |
| | 348 | Montana State University |
| | 354 | Department for transportation FHWA |
| | 532 | Oak Ridge National Laboratory |
| | 537 | University of Washington, Engineered Biomaterials |
| | 719 | National Center for Atmospheric Research (NCAR), Boulder, Colorado |
| | 859 | Brookhaven National Laboratory |
| | B22 | Seattle Biomedical Institute |
| | B23 | University of California |
| | B27 | Institute for Nonlinear Science, University of California |
| | | New York University School of Medicine |
| | D17 | Stanford University |
| | D18 | University of California, Berkeley |
| | | University of Illinois |
| | | University of Texas at Dallas |
| | E41 | Department of Wood and Paper Sciences, North Carolina University, Raleigh |
| | P9 | University of Florida |
| | | University of Notre Dame |
| | P14 | University of Rochester |
| | P16 | Tallahassee High Field Laboratory |
| | P18 | University of Alaska - Geophysical Institute and Physics Department |
| | | University of Florida - Department of Electrical and Computer Engineering |
| NGO*(5)* | 845 | World Organisation for Animal Health |
| | 850 | UNESCO |
| | B22 | International Organisation for Chemical Sciences in Development |
| | B25 | ECVAM (ISPRA, JRC) |
| | E43 | Joint Research Centre, Institute for Environment and Sustainability |
| Other *(1)* | E27 | Ministerial Conference on the Protection of Forests in Europe |



# Major decisions of the CSO

## 164th meeting, Brussels, Belgium • 29-30 March 2006

- *Launching of the first Open Call for proposals with a collection date of 31 May 2006.*
- *The Committee discussed the estimated budgetary requirements over the duration of the future 7th RTD EU Framework Programme (2007-2013). To realise its ambition of having some 250 ongoing COST Actions and setting up new initiatives, the Committee based its views on a preliminary calculation of a total budget requirements of 280 million Euros, to be supported from the specific programme "Cooperation" of the 7th RTD Framework Programme.*
- *14 New Actions approved.*

## 165th Meeting, Tallinn, Estonia • 27-28 June 2006

- *The Committee issued a statement expressing that in order to exploit the full potential of COST for the duration of the next Framework programme the level of financial support to COST should be at a level of 280 Mio Euro.*
- *Success of the first COST Open Call: The Committee was pleased to note the highly successful result of more than 800 preliminary proposals received.*
- *The new COST Domains are operational: following the Committee's decision in November 2005 the new Domain structure has become operational on 1 June 2006. The newly elected Chairs of the Domain Committees were invited to the meeting to present their respective domains to the Committee.*
- *To further increase the involvement of young researchers, the Committee will focus on specific measures to stimulate a policy enabling more involvement of young researches within existing COST Actions.*
- *23 New Actions approved.*
- *World-wide interest towards COST: The Committee approved applications for participation in COST Actions from research institutions from Australia, Bosnia and Herzegovina, Brazil, Canada, Japan, Republic of Moldova, Russian Federation, Ukraine and USA.*

## 166th Meeting, Brussels, Belgium • 20-21 November 2006

- *Following the outcome of the first general open Call for proposals - more than 800 proposals had been received and based on the results of an assessment process, carried out by external evaluators - the Committee approved 39 new COST Actions.*
- *The Committee welcomed the fact that both COST and the ESF, acting as the implementing agent for COST's scientific support, had confirmed their willingness to continue the cooperation also during the 7th RTD Framework Programme (2007-2013).*
- *The Committee discussed a serie of measures to stimulate a policy enabling more involvement of young researches within existing COST Actions*

# Publications supported by COST

| ACTION | TITLE |
|---|---|
| 269 | e-Citizens in the arena of social and political communication. User aspects of ICTs. Work Group Report No. 3 - Beatrice van Bastelaar, Leopoldina Fortunati, Claude Henry - Published by OPOCE |
| 273 | Mobile Broadband Multimedia Networks - Elsevier |
| 275 | Third COST 275 Workshop. Biometrics on the Internet - OPOCE |
| 277 | Workshop. Nonlinear Speech Processing. Heraklion/Crete, Greece - DVD - University of Crete |
| 285 | Modelling and Simulation Tools for Emerging Telecommunications Networks - Springer |
| 292 | Proceedings of 13th International Conference on - Budapest University of Technology and Economics |
| | 7th International Workshop on Image Analysis for Multimedia Interactive Services - WIAMIS 2006 |
| 340 | TsT Transportes, Servicios y Telecomunicaciones. N°10; Fondacion de los Ferrocarriles Espanoles: Transportes e intermodalidad en Europa - Published by Fondacion de los Ferrocarriles Espanoles |
| 346 | Emmissions and Fuel Consumption from heavy duty vehicles. COST 346 Final Report - Published by TU Graz |
| 350 | Final Conference Proceedings: Integrated Assessment of Environmental Impact of Traffic and Transport Infrastructure: Warsaw, Poland, 30 June 2006. - CD-ROM - Published by Conference Bureau, Poland |
| 529 | Proceedings Workshop WG4: Colour Aspects for light sources – colorimetry and it's applications in industry and environment - Bulgarian Academy of Sciences, Institute of Solid State Physics |
| 532 | Triboscience and Tribotechnology. Superior Friction and Wear Control in engines and transmissions - Publindustria |
| 536 | Materials for Advanced Power Engineering 2006 - Forschungszentrum Jülich |
| 539 | Programme and book of abstracts. 2nd workshop. Processing and characterisation of nanostructured systems - Edited by Stojanovic, Srdic |
| 633 | Particulate Matter: Properties related to Health Effects. Proceedings of the international conference April 3 to 5, 2006. - Printed by University of Vienna - Edited by Thomas Kuhlbusch & Flemming Cassee |
| 717 | Review: Use of Radar Observations in Hydrological and NWP Models. EUR 21955 - OPOCE |
| 718 | Meteorology Applications for Agriculture - OPOCE |
| 722 | Workshop Proceedings. Short range forecasting methods of fog, visibility and low clouds - OPOCE |
| 732 | "Proceedings. International Workshop on Quality Assurance of Microscale Meteorological Models - Michael Schatzmann, Rex Britter - Published by University of Cambridge" |
| 846 | Measuring and Monitoring Farm Animal Welfare - H.J.Blokhuis, R.B. Jones, I. Veissier, R. Geers - Published by K.U.Leuven R&D – Zooechnical Centre |
| 847 | Biotechnology Letters. Volume 28, Special Issue: Advances in Biotechnology for Fibre Processing - Springer |
| 848 | Recent Advances in Rabbit Sciences - Published by Plot It - Edited by L. Maertens, P. Coudert |
| 852 | Adaptation and Management of Forage Legumes – Strategies for Improved Reliability in Mixed Swards. 20-24 September 2004, Ystad, Sweden - Swedish University of Agricultural Sciences (SLU) |
| | Workshop on Sward dynamics, N-flows and forage utilisation in legume-based systems. Grado, Italy - Edited by Michael Wachendorf, Aslaug Helgadottir, Giuseppe Parente |
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| 921 | Food Matrices: Structural Organisation and impact on flavour release and perception - OPOCE |
| 924 | The use of UV as a Postharvest Treatment. Status and Prospects. - Published by Antalya Kros Ofset |
| A20 | Digitisation, Internet and television in European landscape - Vita e Pensiero |
| A27 | Landscapes as cultural heritage in the European Research - Bibilioteca de Ciencias |
| | Landmarks; Understanding pre-industrial structures in rural and mining landscapes - Consorzio Interuniversitario Gérard Boulvert |
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| E29 | International Workshop on Earthquake Engineering on Timber Structures - University of Coimbra/Portugal |
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| E34 | Proceedings of Conference on Innovations in Wood Adhesives - Overview of the Innovations and trends in wood adhesives, with an emphasis on the market and environment - School of Architecture, Civil and Wood Engineering HSB, Biel – Switzerland) edited by M. Properzi, F. Pichelin, M. Lehmann |
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| E44 | Conference Proceedings: “Wood Resourcesz and Panel Properties” - Conference co-organized by COST Action E44-E49, 12-13 June 2006, Valencia, Spain, Edited by AIDIMA |
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| FPS | Inventory of Scientific and Technical Research Capabilities at Institutes and Universities in the Pulp and Paper Field within COST Countries - OPOCE |
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| P14 | “Matter in Super-intense Laser Fields” - EMFCSC: “Ettore Majorana” Foundation and Centre for Scientific Culture. International School of Quantum Eletronics |

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